
GPS AutoSteer System Installation Manual



Supported Vehicles

Deutz TTV

610

620

630

LEGAL DISCLAIMER

Note: Read and follow ALL instructions in this manual carefully before installing or operating the AutoSteer system.

Note: Take careful note of the safety information in the Safety Information section and throughout this manual.

The manufacturer disclaims any liability for damage or injury that results from failure to follow the instructions and warnings set forth herein.

Please take special note of the following warnings:

1. There is NO obstacle avoidance system included in the manufacturer's product. Therefore, users must always have an operator on the equipment when the AutoSteer system is in use to look for any obstacles including people, animals, trees, ditches, buildings, etc.
2. During installation of the AutoSteer system and during the Calibration and Tuning processes the vehicle's wheels turn from side to side and the vehicle moves. Be sure that all people and obstacles are clear of the vehicle before installation, calibration and tuning, or use of the AutoSteer system.
3. Use of the AutoSteer system is NOT permitted while the vehicle is on public roads or in public areas. Ensure that the system is OFF before driving on roads or in public areas.

Special Requirements

Tools

This list consists of the tools required to complete the installation. The installer is assumed to have a complete set of common installation tools.

#1 Phillips screwdriver	3/8" open wrench	10mm open wrench
#2 Phillips screwdriver	7/16" open wrench	13mm open wrench
#2 Phillips stubby screwdriver	1/2" open wrench	14mm open wrench
T-25 Torx screwdriver	9/16" open wrench (2)	17mm open wrench
13mm socket and ratchet	11/16" open wrench	19mm open wrench
17mm socket and ratchet	3/4" open wrench	22mm open wrench
19mm socket and ratchet	13/16" open wrench	24mm open wrench
24mm socket and ratchet	7/8" open wrench	27mm open wrench
12" x 1/2" extension	15/16" open wrench	1/8" Allen Wrench
1/2" drive breaker bar	1-1/16" open wrench	5/32" Allen wrench
Drill	10 ft (3 meter) ladder	3/16" Allen wrench
5000 PSI pressure gauge	Tape measure 12ft (3.6m) minimum	1/4" Allen wrench
1" holesaw	Hack saw	Round file
Pliers	Cleaning rags	Step stool or chair
Wire cutters		



Safety Information



Warning Alerts


The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:



- As the operator of the vehicle, you are responsible for its safe operation.
- The AutoSteer system is *not* designed to replace the vehicle's operator.



Note: Verify all screws, bolts, nuts, hose connections and cable connections are tight after the final installation of the AutoSteer system on the vehicle.



	<div data-bbox="670 779 933 821"> WARNING</div> <p data-bbox="435 848 1092 936">To avoid electrical shock hazards, remove the Roof Module from the vehicle before driving under low structures or low electrical power lines.</p>
---	---



	<div data-bbox="670 1083 933 1125"> WARNING</div> <p data-bbox="435 1152 1092 1297">To prevent injury from falling, ensure you are in a stable position on the vehicle when installing or removing the Roof Rail and Roof Module. If the vehicle does not provide a safe platform, use a ladder to safely access the vehicle roof while installing or removing the Roof Rail and Roof Module.</p>
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	<div data-bbox="670 1415 933 1457"> WARNING</div> <p data-bbox="435 1484 1092 1572">To prevent accidental death or injury from being run over by the vehicle, never leave the vehicle's operator chair with the AutoSteer system engaged.</p>
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	<div data-bbox="430 277 1089 346"> WARNING</div> <div data-bbox="430 346 1089 522"><p>High-Pressure Fluid Hazard</p><p>Read this manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.</p></div>
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	<div data-bbox="430 609 1089 678"> WARNING</div> <div data-bbox="430 678 1089 825"><p>To understand the potential hazards associated with the operation of AutoSteer system equipment read the provided documentation before installing the AutoSteer system on a vehicle.</p></div>
---	--



	<div data-bbox="430 913 1089 982"> WARNING</div> <div data-bbox="430 982 1089 1127"><p>To prevent the accidental engagement of AutoSteer and loss of vehicle control while driving on roads, shut down the AutoSteer system (exit the program). Never drive on roads or in public areas with the AutoSteer system turned on.</p></div>
--	--



	<div data-bbox="430 1215 1089 1285"> WARNING</div> <div data-bbox="430 1285 1089 1432"><p>Do not stand close to the wheels and do not move the machine while you are adjusting the Relief Valve. Turn off the engine and engage the parking brake before standing under or next to the machine.</p></div>
---	---



Caution Alerts



The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:



	 CAUTION
	The Roof Module must be removed when transporting or driving the vehicle at speeds above 30 mph (50 km/h). The Roof Module can possibly detach due to wind loads at higher speeds.

	 CAUTION
	The AutoSteer system does not detect obstacles in the vehicle's path. The operator must observe the path being driven in order to avoid obstacles.

	 CAUTION
	When engaged, the AutoSteer system controls only the steering of the vehicle. The operator must control the speed of the vehicle.

	 CAUTION
	The AutoSteer system must be powered OFF when installing or removing the Roof Module.

	 CAUTION
	The AutoSteer system must be powered OFF when starting or cranking the vehicle's engine.

	 CAUTION
	The Roof Module must always be firmly secured to the Roof Rail using the hardware whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.

Vehicle Requirements

This kit is for installing AutoSteer on Deutz-Fahr TTV-600 series vehicles as listed on the manual front cover. If your vehicle is a different model, contact your dealer for the correct installation kit. The vehicle must be equipped with a factory power beyond system that provides quick couplers on the vehicle rear.

The vehicle steering system and hydraulic system must be in good working order before installing the AutoSteer system. Check for loose or worn parts. Drive the vehicle and confirm it steers straight and the wheels can be turned from full left to full right before installing the AutoSteer system. Check for oil leaks in the steering system and hydraulic hoses.

The vehicle electrical system and battery must be in good working order. We recommend the vehicle be fully cleaned, especially under the cab, the front axle, the frame and the rear valve stack before installing the AutoSteer system. A clean vehicle enables installation, cable and hose routing, and also reduces the chance for oil contamination when the hoses are opened. Clean all the AutoSteer vehicle attachment points as described in this manual.

Important Information

Note: Verify all screws, bolts, nuts, hose, and cable connections are tight after the final AutoSteer system installation.

Technical Support

Refer to your Display user manual for technical support information.

Contact Information

Refer to your Display user manual for contact information.

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Installation Overview

This **Installation Overview** chapter information is provided in the following sections:

- *Vehicle Inspection*
- *Installation Kit Overview*
 - *Sub-Assemblies*
 - *Common Kit Components*
 - *Hose Kit Components*
 - *Bracket Kit Components*
 - *Reactive Steering Kit*
- *Installation Procedure Outline*
- *Cable Diagram*

Vehicle Inspection

The vehicle steering system must be in good working condition prior to AutoSteer system installation. Verify the existing steering system is operating correctly by performing the tests listed below in a wide open area.

Note: The steering system test requires a relatively large area. Ensure you have enough room to perform the test before beginning.

1. Drive the vehicle in a low gear and slowly turn the steering wheel full left. The vehicle should steer to the left at a steadily increasing rate until it is making a sharp left turn.
2. Drive the vehicle in a low gear and slowly turn the steering wheel full right. The vehicle should steer to the right at a steadily increasing rate until it is making a sharp right turn.

Note: The change in steering speed and angle should be identical when turning left or right.

3. On flat terrain, drive the vehicle in a straight line in a low gear and release the steering wheel. The vehicle should continue to drive fairly straight without pulling hard left or right.

Note: This vehicle has reactive steering so large bumps on the ground may cause the front wheels and steering wheel to move. Also, if the wheels are turned to full lock left or right and the steering wheel is let go, the steering wheel moves back towards center and the front wheels gradually straighten themselves out.

4. Ask the vehicle driver or owner if they have experienced any vehicle steering problems. The operator should report no steering problems.
- If the vehicle passes the four tests, proceed with the AutoSteer system installation. If the vehicle fails one or more of the tests, the steering system must be evaluated by a dealer and repaired if necessary.

Possible causes of steering problems:

- Worn joints in steering cylinders and tie rods
- Hydraulic problem

Installation Kit Overview

This Installation Kit Overview section is divided into sub-sections for each of the sub-assemblies as shown in *Figure 1-1*. The components in each sub assembly are described in the following sections.

Figure 1-1 Installation Kit Components (PN: 188-0061-01)

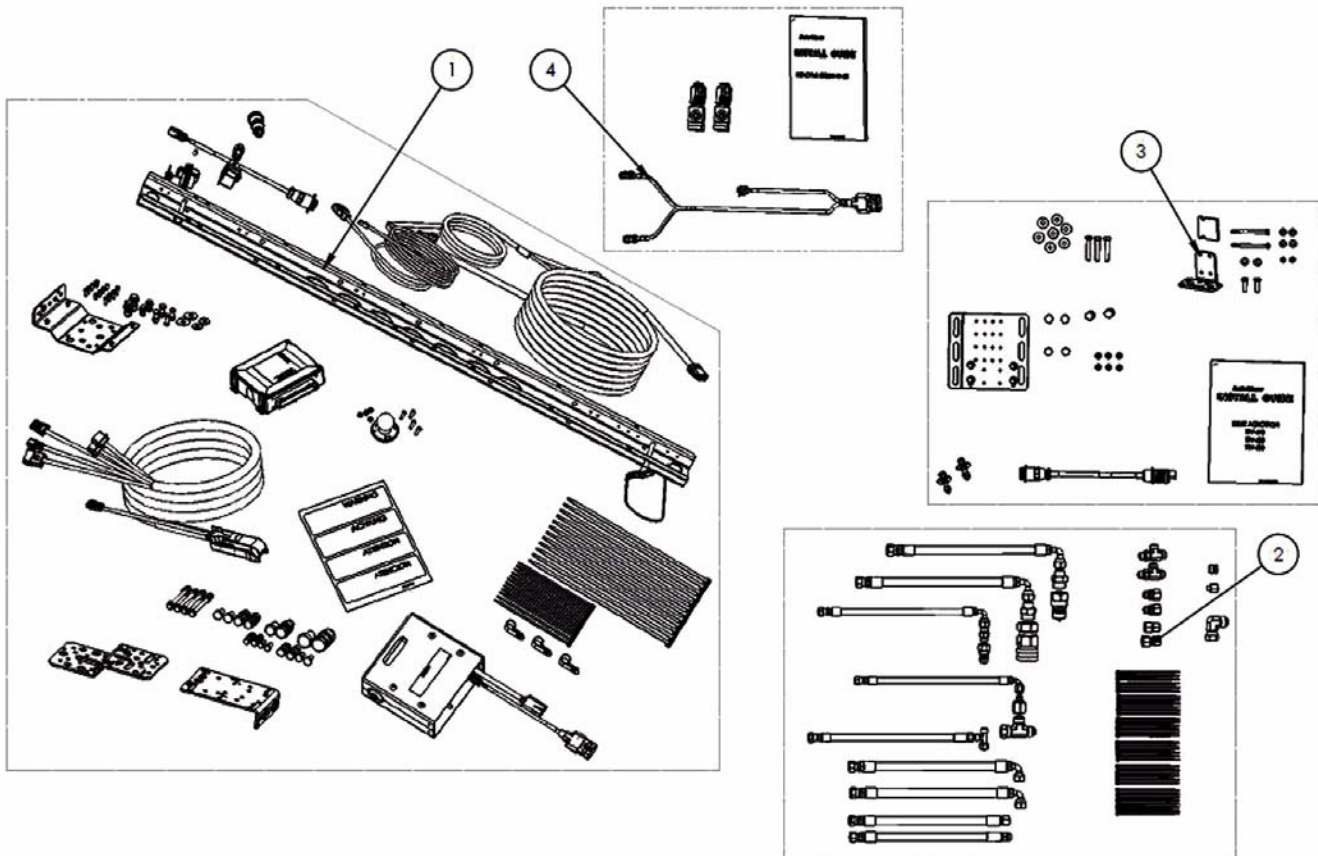


Table 1-1 Installation Kit Component Descriptions (PN: 188-0061-01)

Item	Component	Part Number
1.	Common Kit	153-0001-01
2.	Hose Kit	500-0383-02
3.	Bracket Kit	152-0079-01
4.	Reactive Steering Kit	200-0562-02

Sub-Assemblies

This vehicle installation kit contains the following sub-assembly components:

- *Common Kit Components*
- *Hose Kit Components*
- *Bracket Kit Components*
- *Reactive Steering Kit*

Common Kit Components

Figure 1-2 Common Kit Components (PN: 153-0001-01)

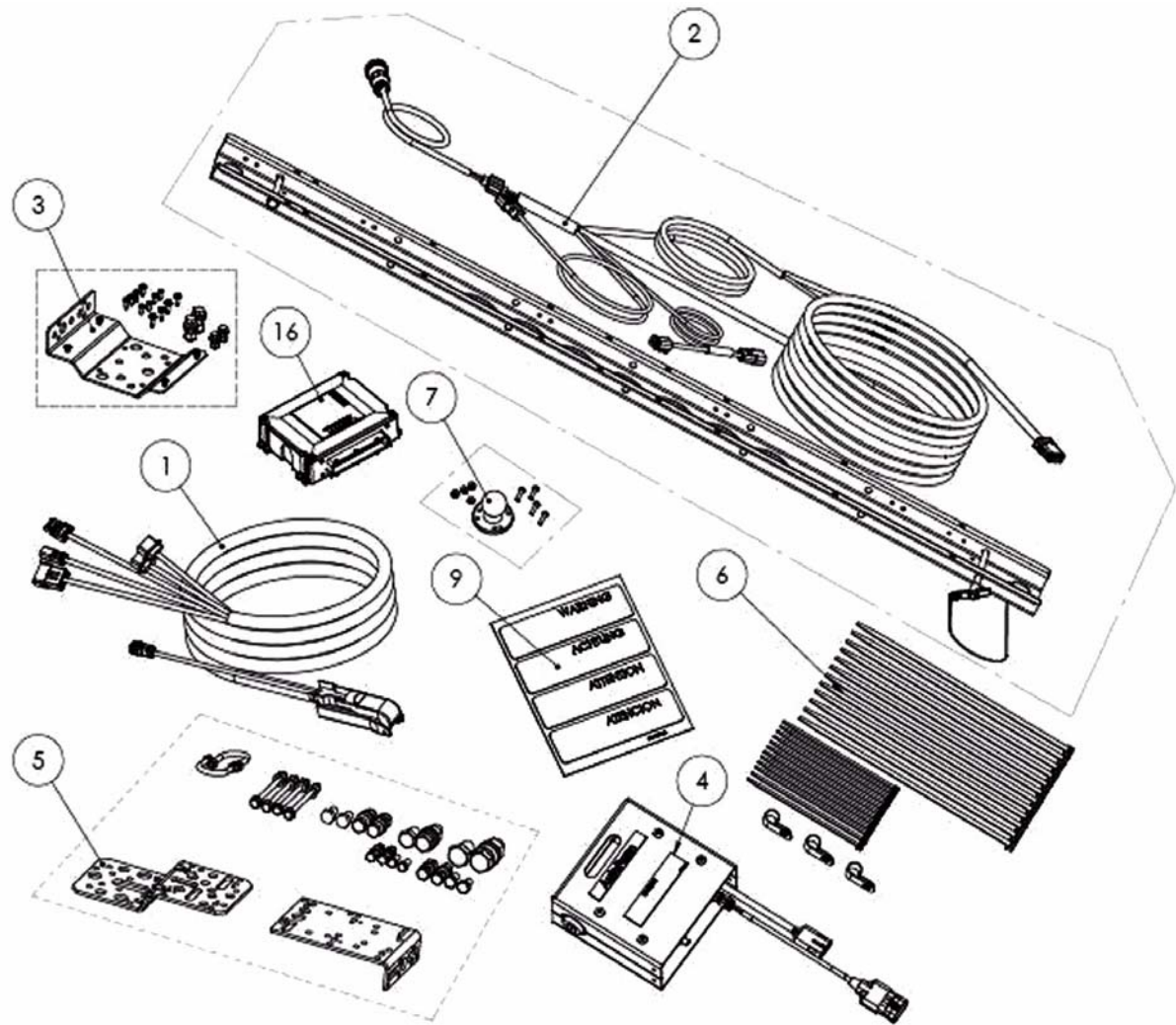


Table 1-2 Installation Kit Components (PN: 153-0001-01)

Item	Component	Part Number
1.	SA Module Harness	201-0371-02
2.	Common Installation Kit	200-0497-02
3.	SA Module Bracket	200-0190-01
4.	Valve Assembly	200-0457-01
5.	Valve Bracket Kit	200-0434-01
6.	Mounting Hardware	200-0076-01

Item	Component	Part Number
7.	Display Mounting Base Assembly	200-0508-01
9.	Warning Labels	603-0074-01
16.	SA Module Assembly	200-0206-01

Hose Kit Components

Figure 1-3 Hose Kit Components (PN: 500-0383-02)

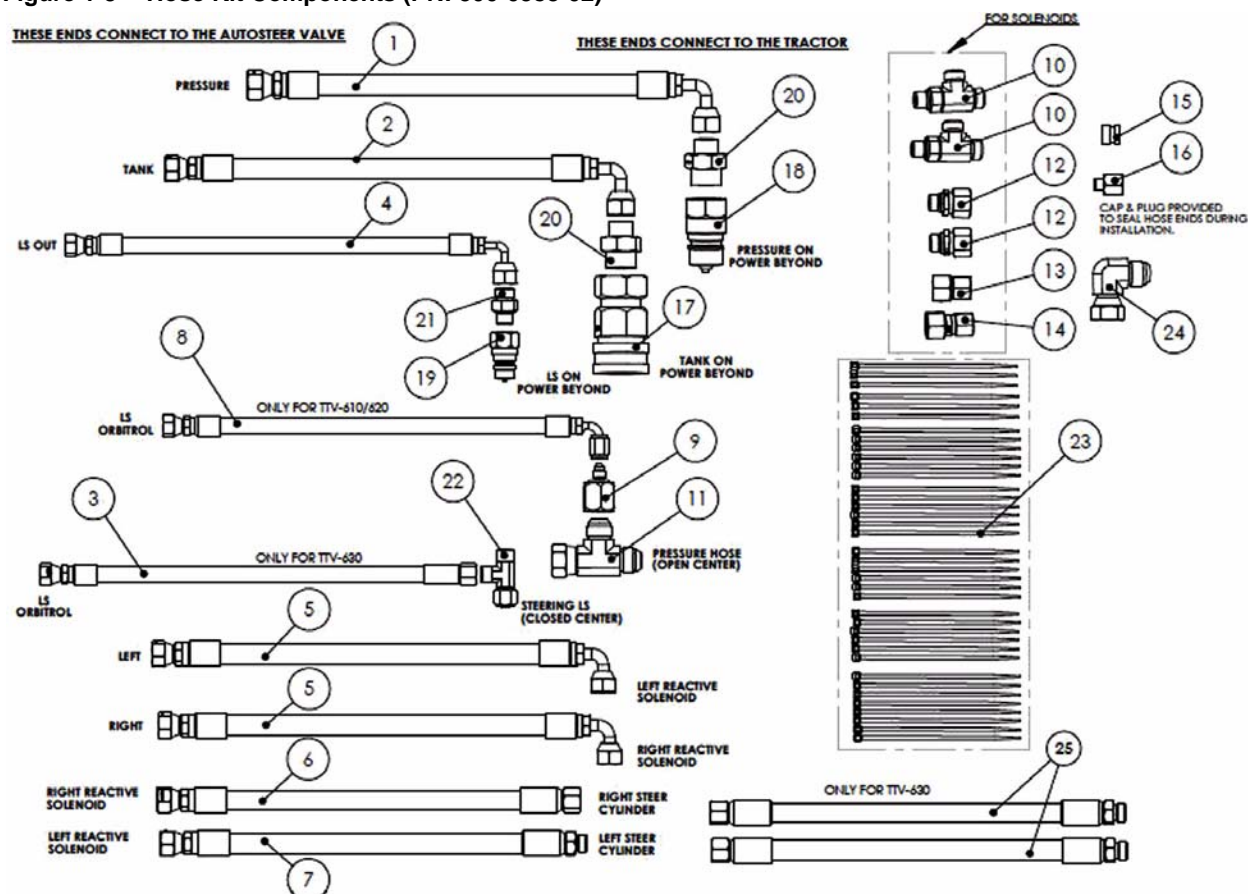


Table 1-3 Hose Kit Components (PN: 500-0383-02)

Item	Component	Part Number
1.	Hose Assembly 3/8" x 90"	F451TC-JCJ9080806-90
2.	Hose Assembly 3/8" x 90"	F451TC-JCJ9060806-90
3.	Hose Assembly 1/4" x 66"	F451TC-JCCA040804-66
4.	Hose Assembly 1/4" x 90"	F451TC-JCJ9040604-90

Sub-Assemblies

Item	Component	Part Number
5.	Hose Assembly 3/8" x 20"	F451TC-JCJ9060606-20
6.	Hose Assembly 3/8" x 106"	F451TC-JCC3061006-106
7.	Hose Assembly 3/8" x 106"	F451TC-JCD0061006-106
8.	HOSE ASSY. 1/4" X 48" -4F ORFS X -4F JIC 90 DEG.	F451TC-JC39040404-48
9.	ADAPTER REDUCER -10F X -4M JIC	10-4 TRTXN-S
10.	ADAPTER RUN TEE -6 ORFS X -6 ORB	6 R5OLO-S
11.	RUN TEE -10 JIC	10 R6X-S
12.	ADAPTER 12L M18 24 DEGREE 9/16 SAE-ORB	GE12L9 16UNFCF
13.	ADAPTER SWIVEL UNION REDUCER 12L M18 10L M16	GZR10L 10SCF
14.	ADAPTER TUBE END REDUCER EO 12L M18(SWIVEL) 10L M16	RED12 10L71
15.	ADAPTER PLUG 10L MALE THREAD	ROV10L
16.	ADAPTER CAP 10L FEMALE THREAD	VKA10
17.	COUPLER FEMALE 3/4 ISO- 7241-1 ORB -12	6608 12 12
18.	COUPLER, MALE 3/4 ISO 7241-1 ORB -12	6610 12 12
19.	COUPLER, MALE 3/8 ISO 7241-1 ORB -6	6610 6 6
20.	ADAPTER -12 ORB x -8M ORFS	8-12F5OLO-S
21.	ADAPTER -6M ORB X -6M ORFS	6 F5OLO-S
22.	ADAPTER RUN TEE 8L M14 24 DEG.	EL08LA3C
23.	KIT CABLE TIE HOSE ID	200-0467-01
24.	ADAPTER ELBOW -10 JIC 90 DEG.	10 C6X-S
25.	Hose Assembly 3/8" x 18"	F451TC-C3D0101006-18

Bracket Kit Components

Figure 1-4 Bracket Kit Components (PN: 152-0079-01)

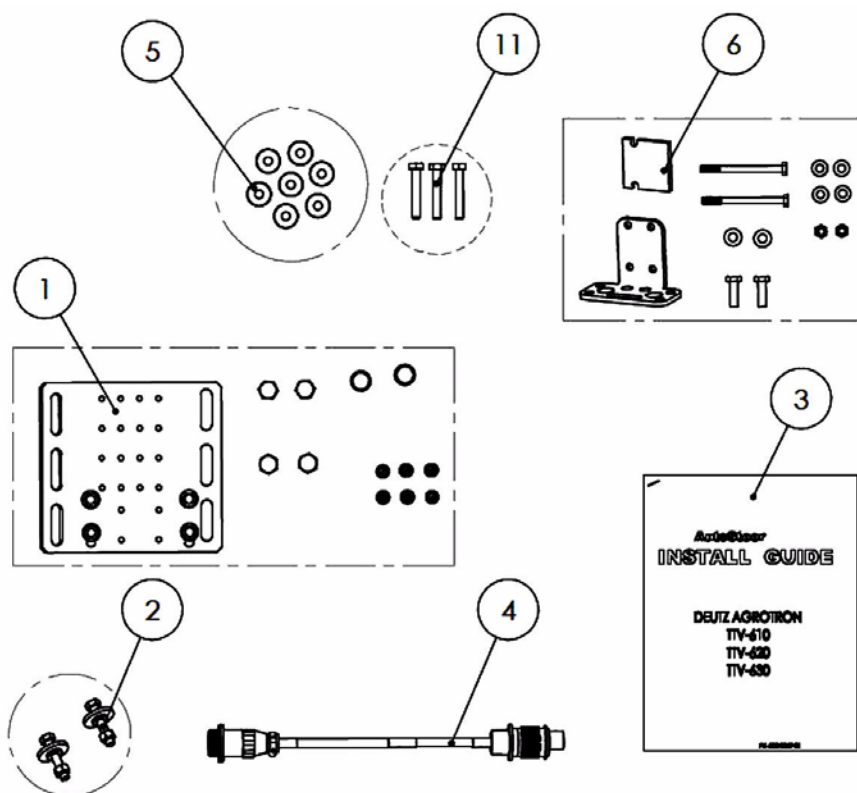


Table 1-4 Bracket Kit Components (PN: 152-0079-01)

Item	Component	Part Number
1.	Display Bracket Kit	200-0469-02
2.	Roof Bolt Kit	200-0290-01
3.	Installation Guide	602-0269-01
4.	Power Adapter Cable	201-0234-01
5.	Fender Washers	517-0021-01
6.	Reactive Solenoid Mount	200-0564-01
11.	Hex Head Bolt M8 x 1.25 x 50	513-0052-01

Reactive Steering Kit

Reactive Steering Kit Components (PN: 200-0562-02)

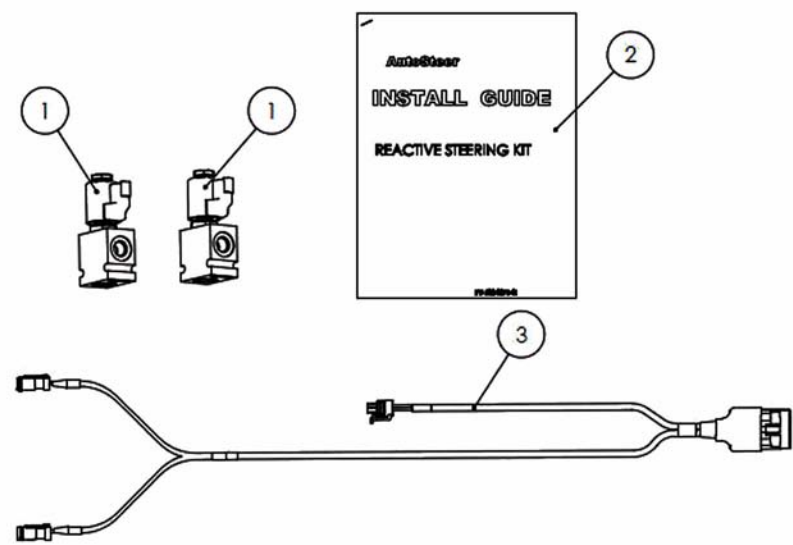


Table 1-5 Reactive Steering Kit Components (PN: 200-0562-02)

Item	Component	Part Number
1.	Reactive Steering Solenoids	500-0361-01
2.	Reactive Steering Manual	602-0275-01
3.	Reactive Steering Harness	201-0480-01

Installation Procedure Outline

Note: The system interconnect cable diagram in the *Cable Diagram* on page 10 section of this chapter shows the AutoSteer electrical connections.

1. Verify that all components have been received.

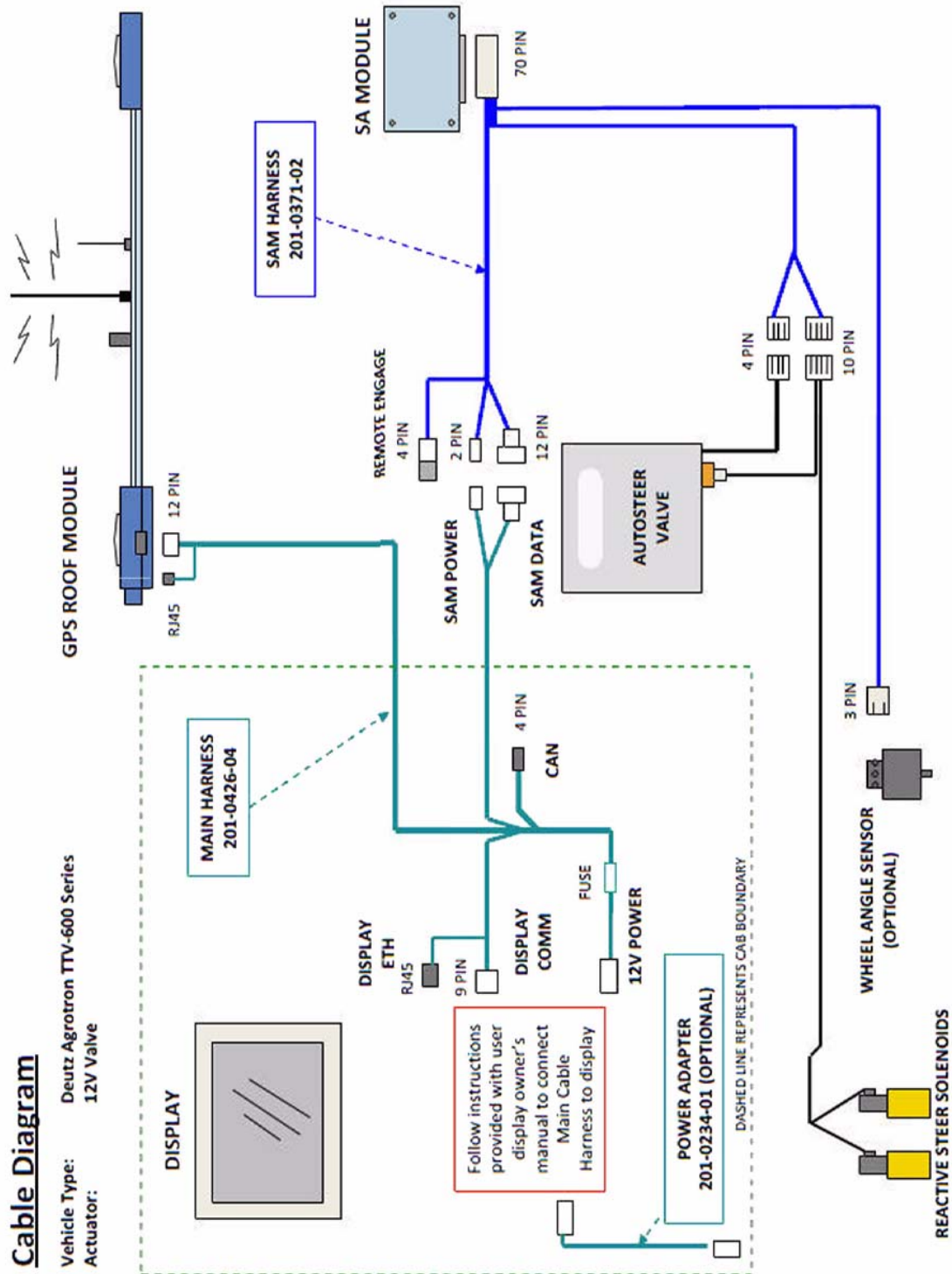
Note: *Step 2, Step 3, Step 4, Step 5* and *Step 9*, are skipped if you are installing an electric steering actuator.

2. Install the Steering Valve.
3. Install the Hydraulics.
4. Install the Wheel Angle Sensor. (Optional).
5. Install the SA Module.
6. Install the Roof Rail on the cab roof.
7. Install the Roof Module on the Roof Rail.
8. Install the Display using a RAM Mount Ball.
9. Install the SA Module Harness.
10. Install the Main Cable Harness.
11. Connect the Main Cable Harness to the Display Harness.

Note: Instructions for connecting the vehicle kit cables to the Display can be found in the Display user manual.

12. Verify that all connectors are properly coupled and secured.
13. Power ON the AutoSteer system.
14. Calibrate the vehicle.
15. Tune the vehicle.
16. Verify that the system has been installed properly and operates satisfactorily.

Cable Diagram



Steering Valve Installation

This **Steering Valve Installation** chapter contains the following sections:

- *Overview*
- *Determining Orbitrol Type*
 - *Closed Center*
 - *Open Center*
- *Steering Valve Configuration*
- *Assemble and Mount the Steering Valve*
 - *Normal Mounting Position*
 - *Alternative Mounting Location*
- *Install the Hydraulic Hoses and Fittings*
 - *Reactive Solenoid Connection*
 - *Power Beyond Connections*
 - *Load Sense Orbitrol Hydraulic Connection*
 - *Closed Center Orbitrol Load Sense Connection*
 - *Open Center Orbitrol Load Sense Connection*
 - *Right and Left Steer Hose Connection*
- *Steering Valve Checklist*

Overview

The AutoSteer valve is connected to the vehicle Power Beyond system using quick couplers for the Pressure, Tank and Load Sense oil supply hydraulic connections. *Figure 2-1*, *Figure 2-2* and *Table 2-1* show the functions and fitting sizes for the Steering Valve. Confirm the vehicle has the factory Power Beyond system fully installed. The AutoSteer system requires two additional steer hoses to be connected between the AutoSteer valve and the front axle steering cylinder. Additionally, a hose is connected between the AutoSteer valve and the Orbitrol Load Sense line (on Closed Center Orbitrol installations) or Orbitrol Pressure Line (on Open Center Orbitrol installations) to detect a pressure spike for system kick out when the driver turns the steering wheel. The only difference between Open Center or Closed Center installations is the hose connection for manual kick-out.

Before starting the AutoSteer valve installation, determine if your vehicle uses a Closed Center or Open Center Orbitrol and then refer to the appropriate instructions in this manual. The vehicle uses mostly metric hose fittings but can have JIC fittings on the Open Center gear pump lines. The AutoSteer valve uses ORFS style hose fittings. The hose kit provides the necessary hose fittings.

Figure 2-1 Steering Valve Assembly

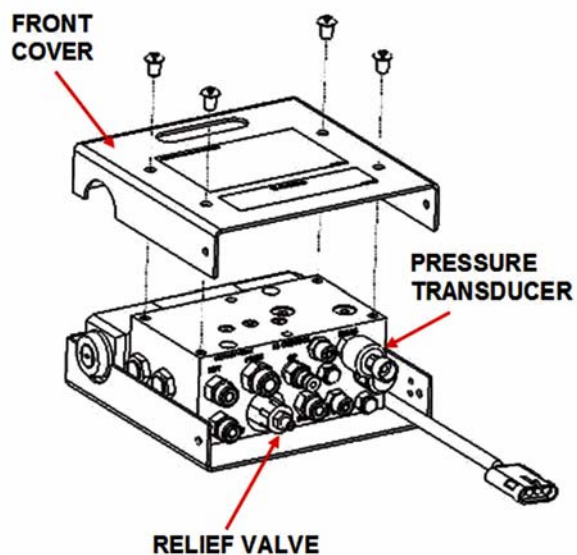
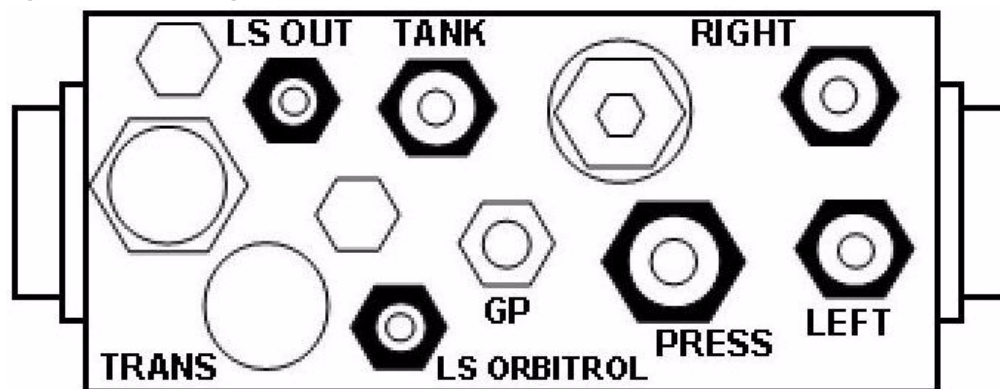


Figure 2-2 Steering Valve Port Identification



Note: The ports shown in *Figure 2-2* are upside-down relative to the ports shown in *Figure 2-1*.

Table 2-1 Valve Functions and Fitting Sizes

Hose Adapter	Fitting Type/Size
PRESS = PUMP PRESSURE (Power Beyond)	-8 ORFS
TANK = TANK / RETURN (Power Beyond)	-6 ORFS
LS ORBITROL = LS FROM ORBITROL	-4 ORFS
LS OUT = LS (Power Beyond)	-4 ORFS

Hose Adapter	Fitting Type/Size
LEFT = LEFT STEERING CYLINDER	-6 ORFS
RIGHT = RIGHT STEERING CYLINDER	-6 ORFS
GP = DIAGNOSTICS PORT	1/8"
TRANS = PRESSURE TRANSDUCER	-4 SAE ORB.

Determining Orbitrol Type

The vehicles supported by this installation kit PN: 188-0061-01 may use either a Closed Center Orbitrol or an Open Center Orbitrol. You need to identify the Orbitrol type before proceeding with the AutoSteer system installation. The following section provides information for identifying the two Orbitrol types.

Closed Center

There are five hoses connected to the Closed Center Orbitrol located under the cab front:

- Pressure
- Tank
- Load Sense
- Right
- Left

Look under the cab front and try to identify a small diameter Load Sense hose connecting the Orbitrol to the steering priority valve on the transmission top near the vehicle rear. If your vehicle has an Orbitrol with a Load Sense hose, it is a Closed Center Load Sense Orbitrol. Use the Closed Center instructions and Closed Center hose diagram.

Open Center

There are four hoses connected to the Open Center Orbitrol located under the cab front:

- Pressure
- Tank
- Right
- Left

Look under the cab front and identify the hoses connected to the Orbitrol. If you find only four hoses without the smaller diameter Load Sense hose, your vehicle has an Open Center Orbitrol. An Open Center Orbitrol installation can be further confirmed by locating the engine right-side steering gear pump.

Follow the Pressure line from the gear pump top. See *Figure 2-3*. The Pressure line should route towards an accumulator and continue directly to the Orbitrol without passing through the Priority Valve. See *Figure 2-4*. If the gear pump Pressure line

routes to the Orbitrol as described without passing through a Priority Valve, the Orbitrol is Open Center. Use the Open Center instructions and Open Center hose diagram.

Figure 2-3 Gear Pump

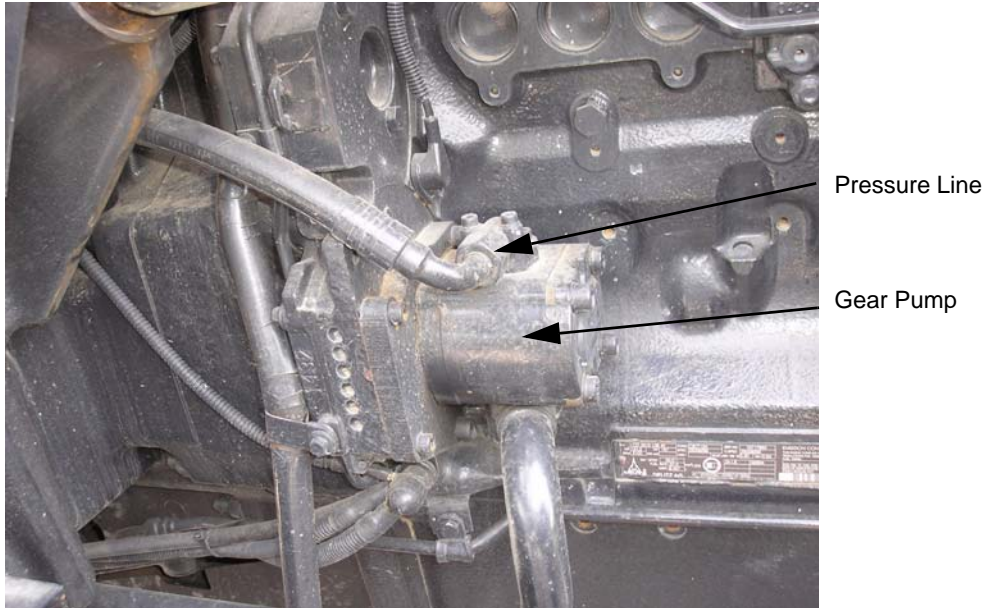
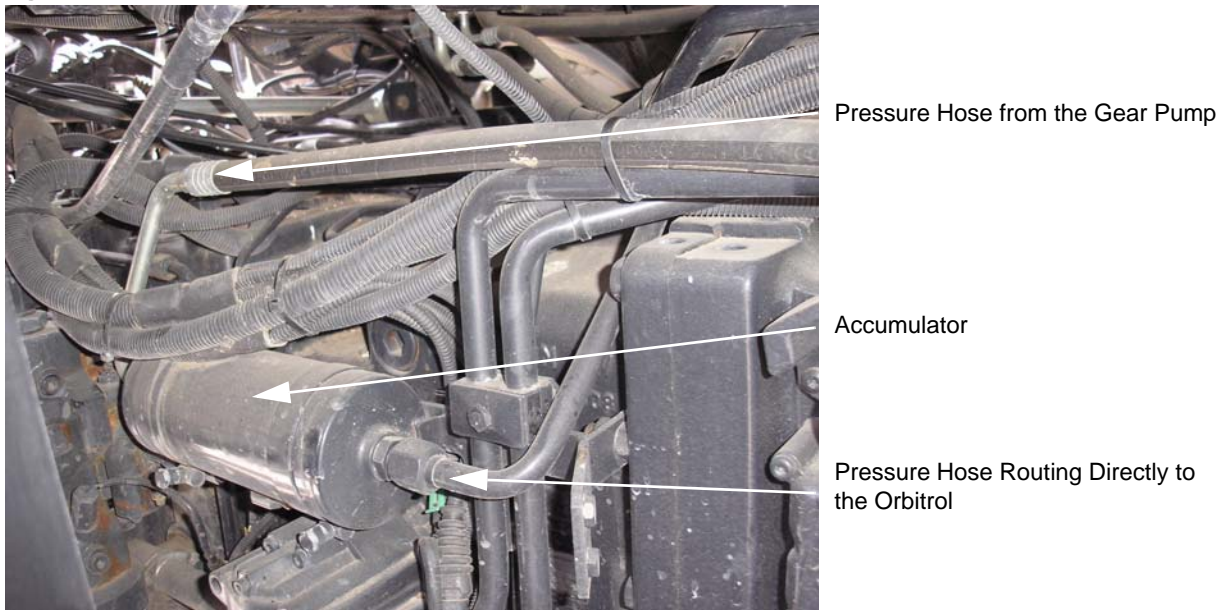


Figure 2-4 Accumulator



Steering Valve Configuration

Prior to installing the Steering Valve on the vehicle, the Steering Valve must be configured for use on a Power Beyond system. This requires the installer verify the proper plugs and orifices have been installed in the access ports on the Steering Valve itself. This installation also requires a bleed down orifice be installed in the Steering Valve, which enables the Load Sense pressure to bleed down after the Steering Valve no longer requires oil flow. This procedure can be performed after the Steering Valve has been installed on the vehicle; however it is much easier to do this prior to installation.

Figure 2-5 shows the Steering Valve front and side ports which are accessed after the front cover has been removed. There are other ports and orifices on the Steering Valve. However, the ports described here are the only ports requiring modification for this installation. A 0.022" Orifice is installed in Port **13A** to enable the Load Sense to bleed down. A plug is inserted into Port **13B** to enabling the Steering Valve to work in a Power Beyond installation.

Table 2-2 shows the factory access ports default positions and the positions they should be in for a Power Beyond installation. Port **13C** is not accessed in this installation and is not identified in Figure 2-5.

Figure 2-5 Steering Valve Front and Side Ports

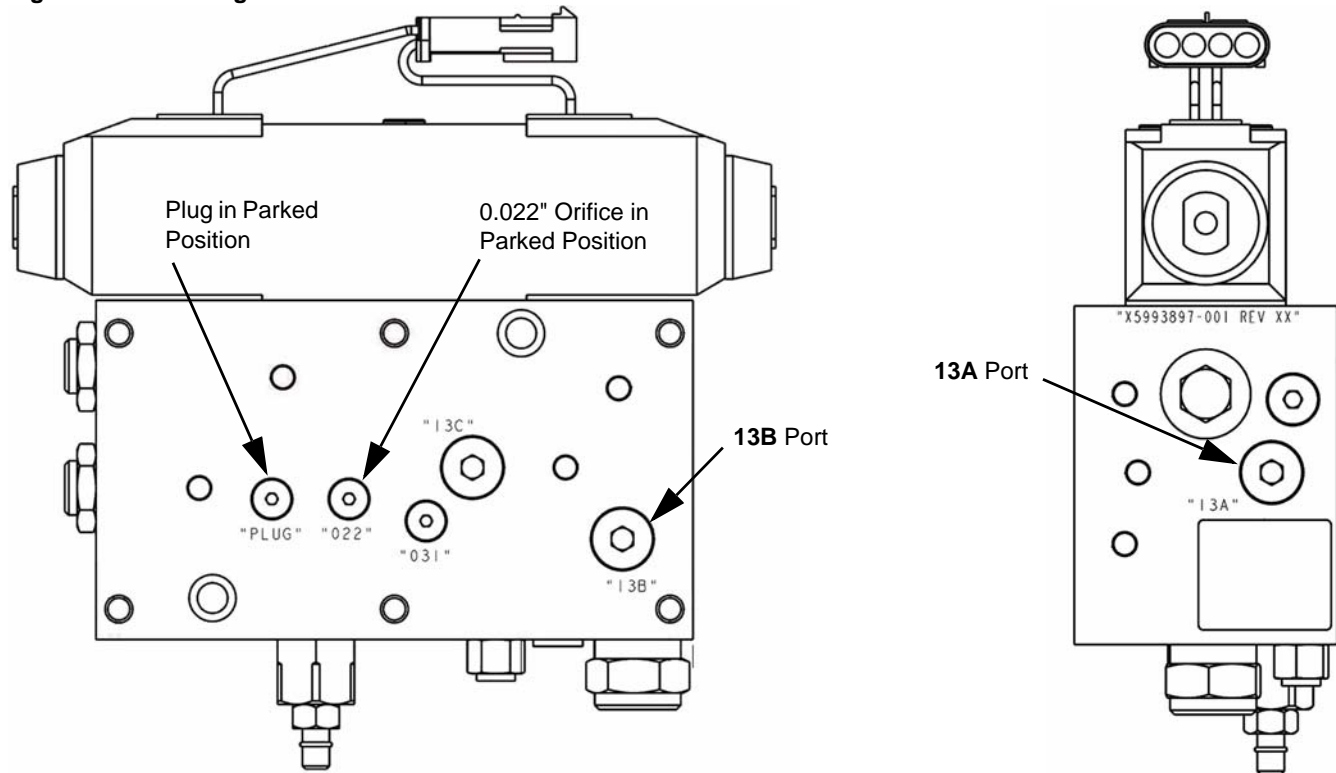


Table 2-2 Plug and Orifice Configuration Summary

Type of Installation	13A	13B	13C
Factory Default Configuration	Plug	Open	Plug
This Vehicle Configuration	0.022" Orifice	Plug	Plug

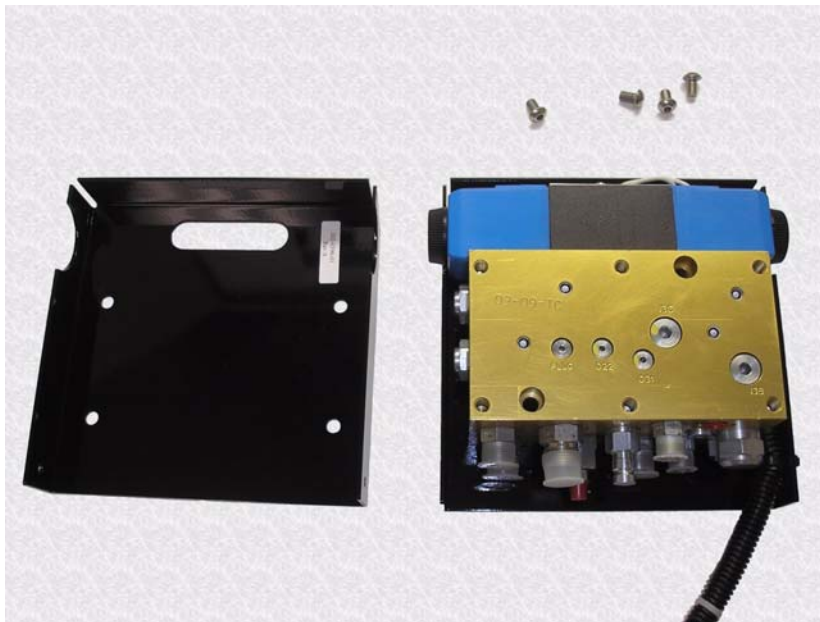
1. Place the Steering Valve on a flat surface. Remove the four cover bolts with a 3/16" Allen wrench. See *Figure 2-6*.

Figure 2-6 Remove Steering Valve Cover Bolts



2. Save the bolts for reassembly after Steering Valve installation. See *Figure 2-7*.

Figure 2-7 Front Cover Removed



3. Locate the Plug stored in the Steering Valve body park position and remove it with a 1/8" Allen wrench. See *Figure 2-8*.

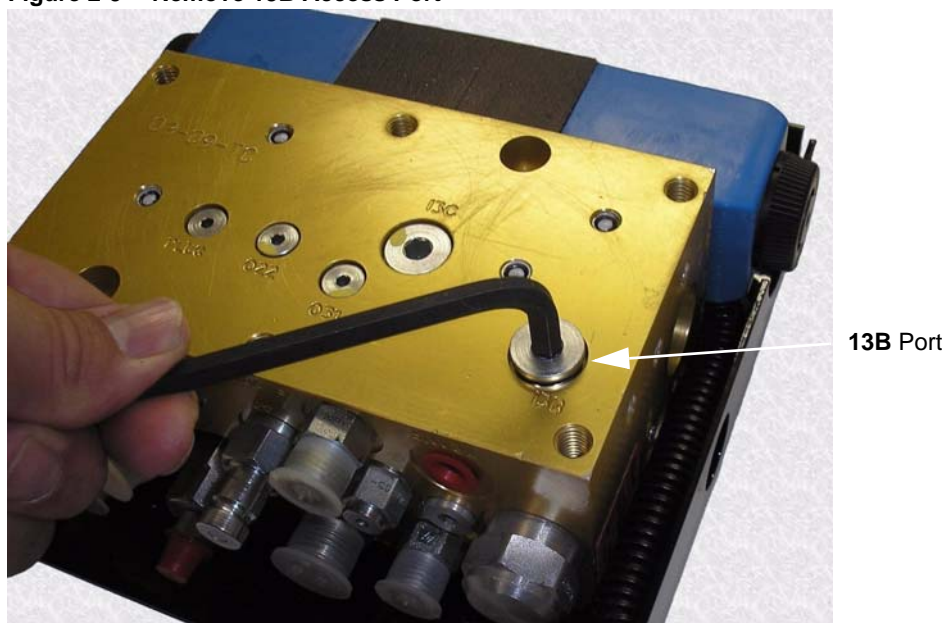
Note: The plugs, orifices, and port access plugs are very tight. Loosening them could take a considerable amount of force. Verify your tools are in good condition prior to attempting this procedure.

Figure 2-8 Remove Plug from Steering Valve



4. Locate the Steering Valve **13B** port and remove the access port with a 1/4" Allen wrench. See *Figure 2-9*.

Figure 2-9 Remove 13B Access Port



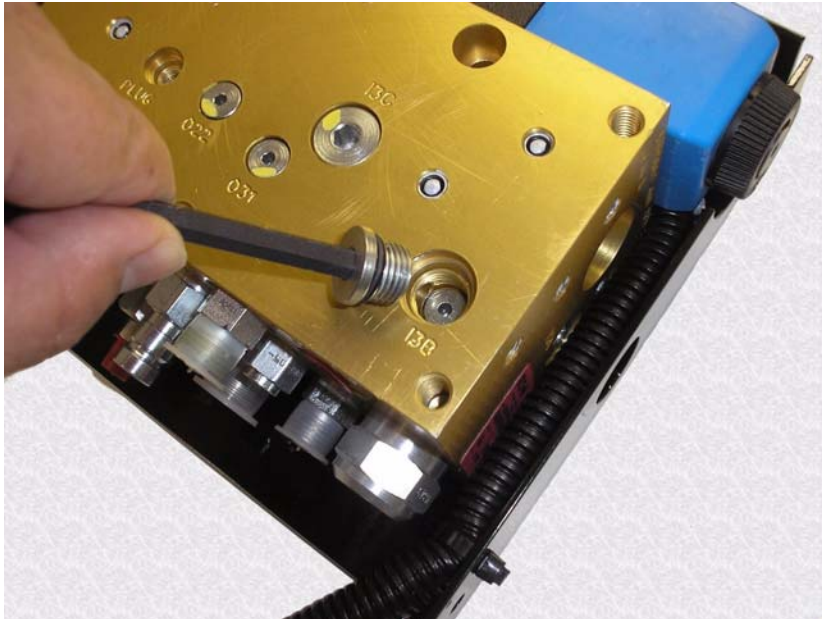
5. Install the Plug removed in *Step 3* into the bottom of port **13B** and tighten it with a 1/8" Allen wrench. See *Figure 2-10*.

Figure 2-10 Install Plug into Port 13B



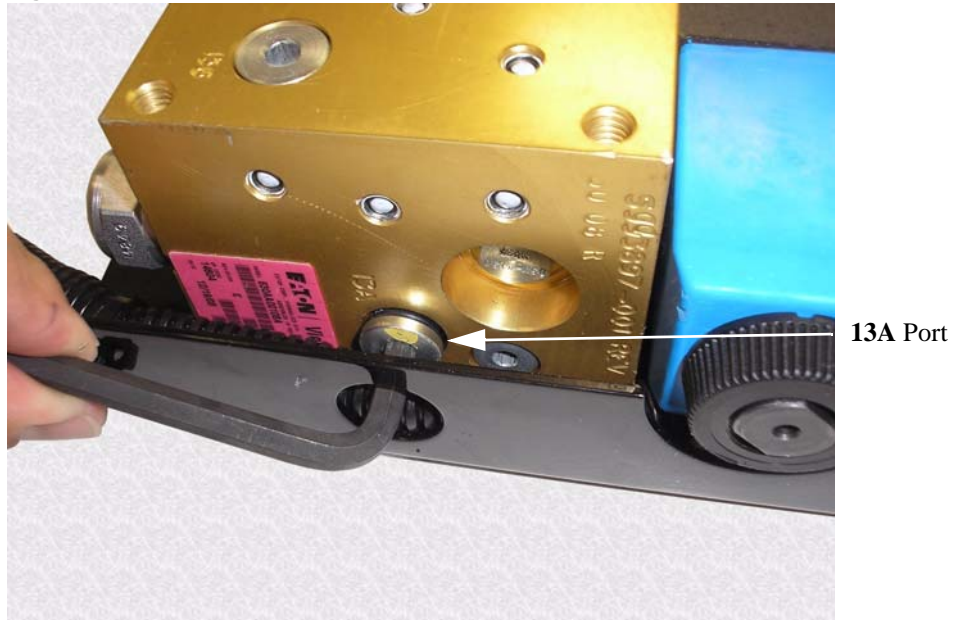
6. Replace the access port plug into Port **13B** and tighten with a 1/4" Allen wrench. See *Figure 2-11*.

Figure 2-11 Replace Access Port Plug



7. Locate the **13A** port on the Steering Valve side and remove the access port with a 1/4" Allen wrench. See *Figure 2-12*.

Figure 2-12 Remove Port 13A Access Port



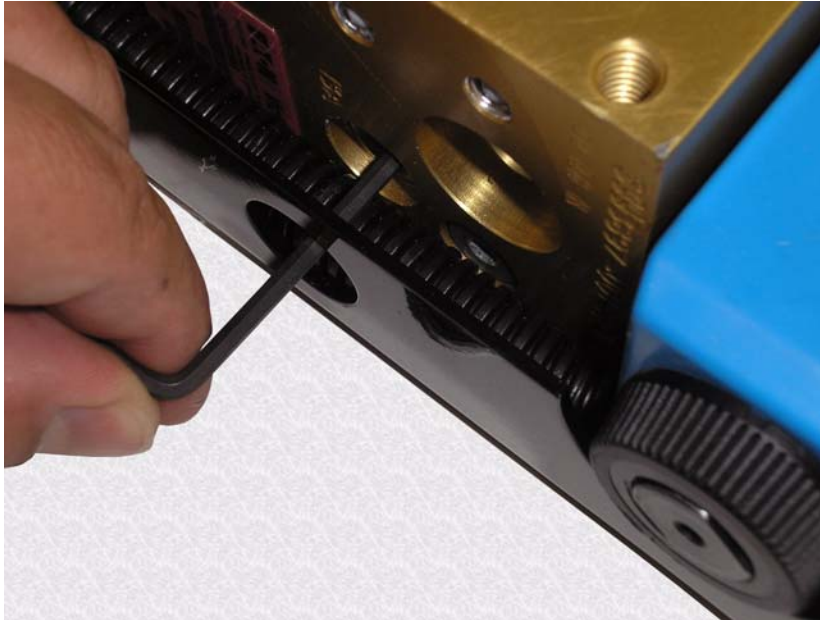
8. Identify the plug already installed in the port bottom. See *Figure 2-13*.

Figure 2-13 Identify Plug in Port Bottom



9. Remove the existing 13A port plug with a 1/8" Allen wrench. See *Figure 2-14*.

Figure 2-14 Remove Existing Plug from Port 13A



10. Locate the 0.022" Orifice stored in the Steering Valve body park position and remove it with a 1/8" Allen wrench. See *Figure 2-15*.

Figure 2-15 Remove 0.022" Orifice from Steering Valve



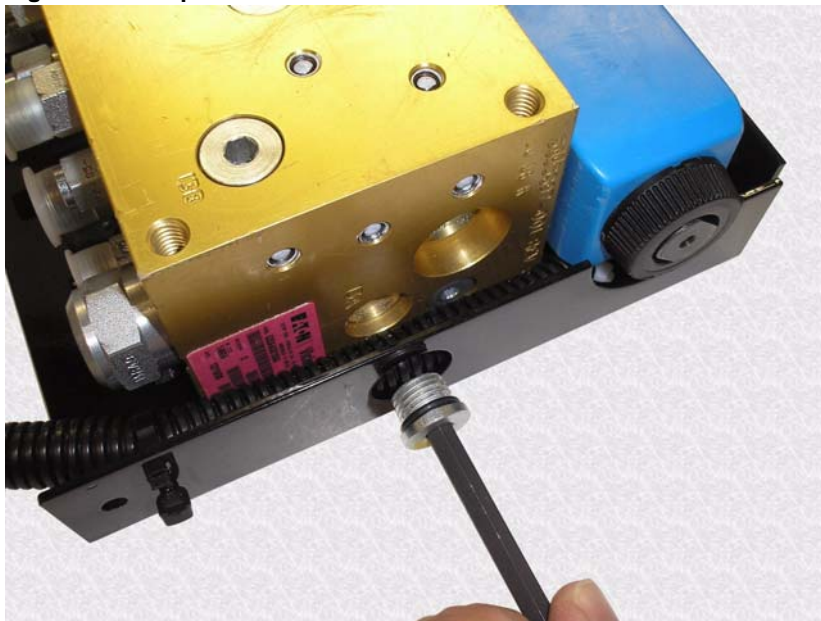
11. Install the 0.022" Orifice removed in *Step 10* into the bottom of Port **13A** and tighten it with a 1/8" Allen wrench. See *Figure 2-16*.

Figure 2-16 Install 0.022" Orifice into Port 13A



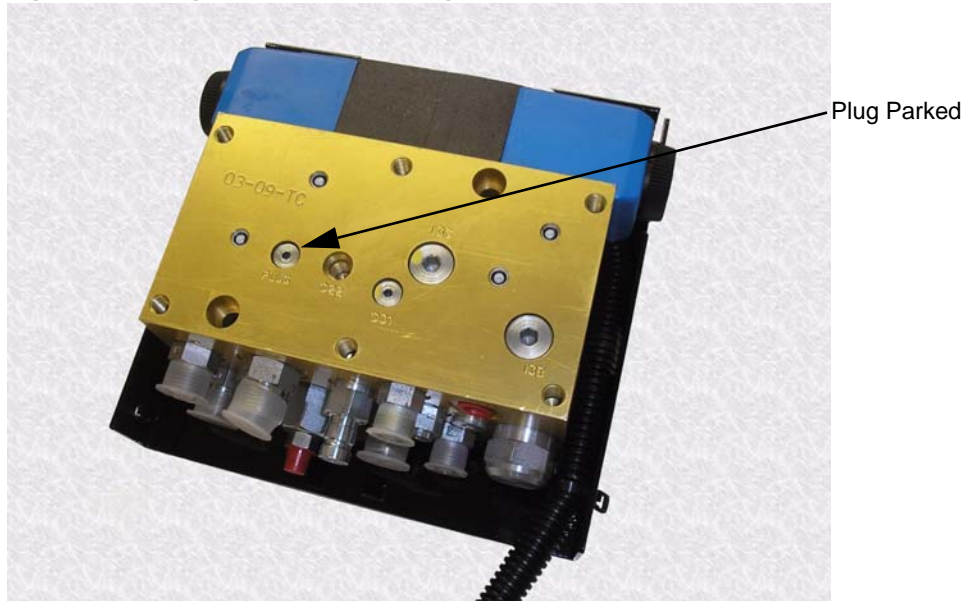
12. Replace the access port plug into Port **13A** and tighten with a 1/4" Allen wrench. See *Figure 2-17*.

Figure 2-17 Replace Access Port



13. Place the plug that was removed from Steering Valve block Port 13A into the park position. See *Figure 2-18*.

Figure 2-18 Plug Inserted into Steering Valve



14. This concludes the Steering Valve configuration.

15. The valve is now ready for vehicle installation.

Assemble and Mount the Steering Valve

The Steering Valve mounting position depends on the vehicle model and if it has a standard fuel tank or a large capacity fuel tank. Most TTV-610 and 620 vehicles have a standard fuel tank and the Steering Valve may be installed using the “L” bracket attached to the transmission housing using the existing two right-side bolts. Most TTV-630 vehicles use a high capacity fuel tank requiring Steering Valve installation in a higher position under the cab right-side. The hose connections and general installation procedures are the same for both mounting positions. Before starting the installation, inspect your vehicle and determine the Steering Valve mounting position.

Note: Some models such as the TTV-630 may have an additional fuel tank under the right side steps preventing the normal valve installation. On these vehicles, the valve must be installed in a different location under the cab right-side.

The two valve mounting location procedures are listed below. Once you have mounted the valve the remaining portions of the valve assembly are essentially the same with a different “S” bracket mounting position for the reactive solenoid bracket.

- *Normal Mounting Position*
- *Alternative Mounting Location*

Normal Mounting Position

1. Remove the side steps, toolbox and plastic fender extender on the vehicle right-side for easier access to the hose and valve connection location. See *Figure 2-19*.

Note: You need a T-25 Torx driver, 13mm wrench and 19mm socket wrench to remove the side steps, toolbox and plastic fender extender.

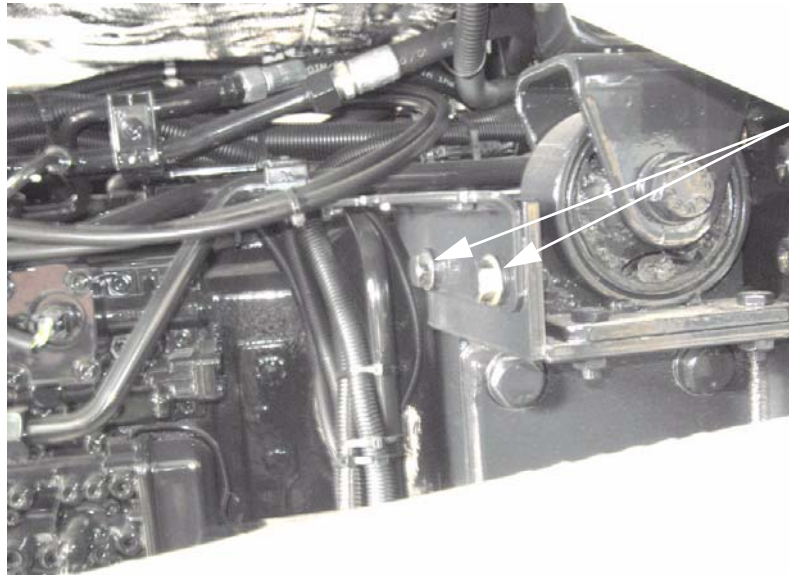
Figure 2-19 Side Steps and Toolbox



2. The Valve Bracket is mounted to the right-hand side front cab mount. See *Figure 2-20*.

Note: Before the Valve Bracket is installed it must be attached to the Steering Valve.

Figure 2-20 Steering Valve Mounting Position

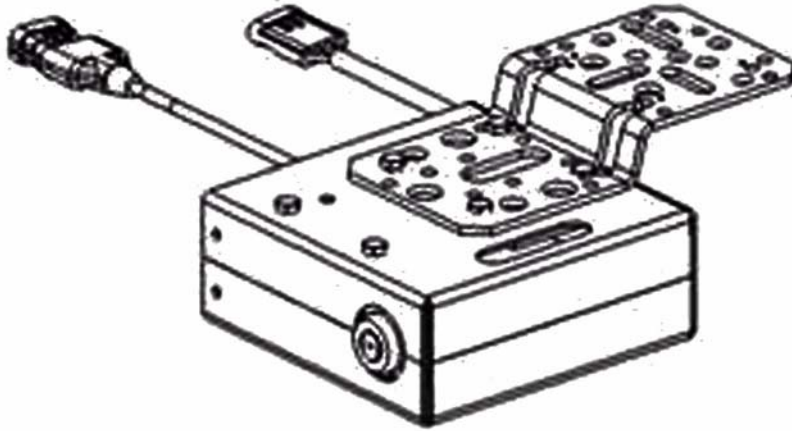


Mounting Bolts

Alternative Mounting Location

1. The Steering Valve is installed under the “S” shaped Steering Valve bracket.

Figure 2-21 Valve Mounted on “S” Bracket



Alternative Mounting Location

2. Install the "S" shape valve bracket under the cab right side. See *Figure 2-22*.
3. Secure to the cab using the kit provided M10 hex bolt and washer.

Note: If necessary, drill a new 10mm hole in the bracket for the mounting bolt.

Figure 2-22 Valve Mounted Under Cab Right Side



"S" Bracket Mounting Bolt

4. Mount the valve to the bracket using four hex bolts after all the hose connections have been completed and the Relief Valve has been adjusted.

Note: You can slide the valve onto the bracket with the two right side mounting bolts already partially screwed so the screws can support the valve weight while you insert the remaining two bolts.

Note: After fully installed, the valve must have sufficient clearance to enable cab suspension movement.

5. Install the solenoids under the cab right-side using the kit provided bracket. Use the same mounting bolt as the valve bracket. See *Figure 2-23*.

Note: The hose connections are the same as the TTV-610/620 installation and the only difference is the Steering Valve mounting position.

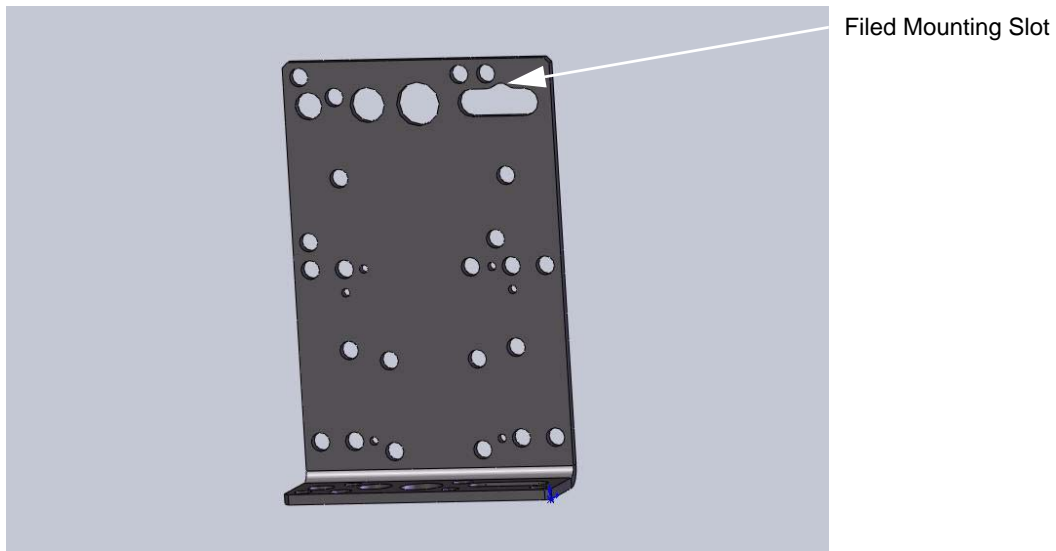
Figure 2-23 Reactive Solenoids Mounted



Note: Only one Steering Valve “L” bracket position enables the Steering Valve to fit the mounting position shown in *Figure 2-20*. To enable the mounting for this installation the “L” bracket slotted bracket hole must be filed to size prior to installation.

6. File the “L” bracket slotted hole. See *Figure 2-24*.

Figure 2-24 Filed Slotted Hole

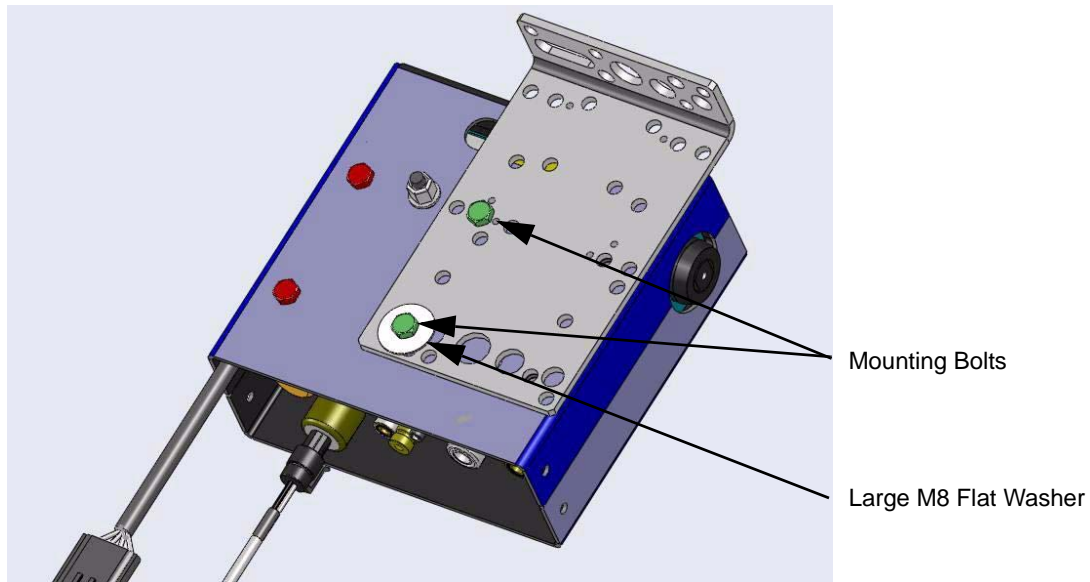


7. Mount the Steering Valve to the “L” bracket using only the two center bolts.

Note: The bolt using the filed slot requires a kit supplied large M8 washer (PN: 517-0021-01).

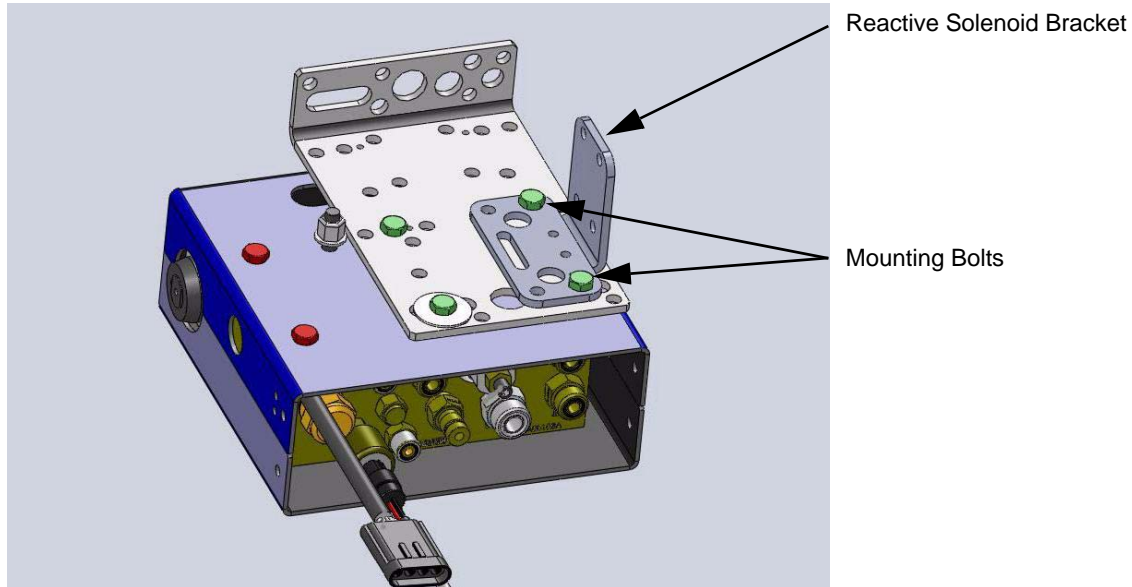
8. Tighten the mounting bolts using a 1/2" wrench. See *Figure 2-25*.

Figure 2-25 Mount Bracket



9. Mount the Reactive Solenoid Bracket to the Steering Valve and “L” bracket.
10. Use the kit provided 1" x 5/16" UNC bolts.
11. Tighten the bolts using a 1/2" wrench. See *Figure 2-26*.

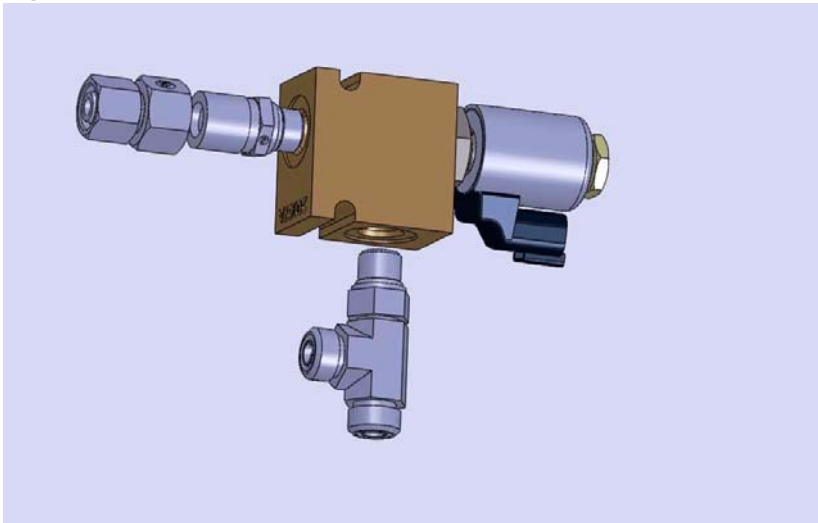
Figure 2-26 Mount Reactive Solenoid Bracket



12. Assemble the reactive solenoids. See *Figure 2-27*.

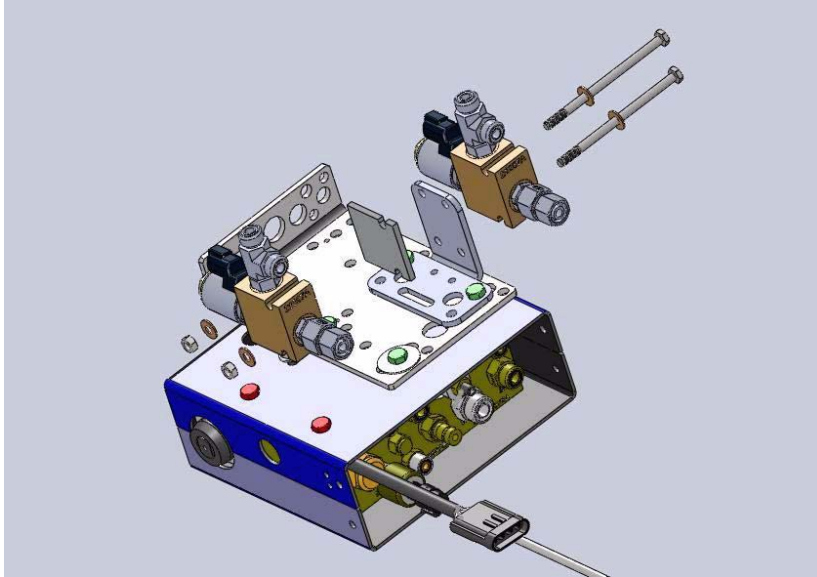
Note: The right solenoid has a female M16 fitting and the left solenoid has a male M16 fitting.

Figure 2-27 Assemble the Reactive Solenoids



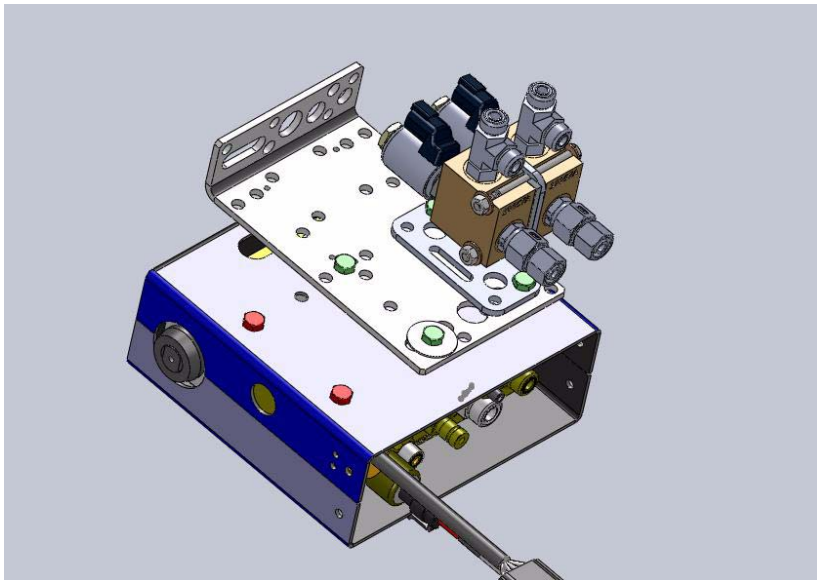
13. Mount the reactive solenoids to the bracket using the kit supplied 3-1/4" x 1/4" UNC bolts, nuts and washers. See *Figure 2-28*.

Figure 2-28 Assemble Reactive Solenoids to Bracket



14. Tighten the UNC bolts using a 7/16" wrench.
15. The Steering Valve is now assembled. See *Figure 2-29*.

Figure 2-29 Steering Valve Assembled



16. Remove two bolts from the cab mount bracket using a 19mm socket and ratchet and discard the bolts.
17. Remove cable tie holding the transmission cables to the cab mount bracket. See *Figure 2-30*.

Figure 2-30 Removing Bolts from Cab Mount



18. Mount the Steering Valve assembly to the cab mount bracket using the two kit supplied M12 x 50 bolts. See *Figure 2-31*.
19. Tighten the mounting bolts using a 19mm socket, ratchet and wrench.
20. The Steering Valve is now installed.

Figure 2-31 Mounted Steering Valve Assembly



Install the Hydraulic Hoses and Fittings

The installation procedure for the Closed and Open Center Orbitrol configurations is identical except for the Load Sense connection. The following procedure branches when the Load Sense connection is being performed.

Figure 2-32 shows a Closed Center Orbitrol hydraulic installation schematic. Figure 2-33 shows an Open Center Orbitrol hydraulic installation schematic.

Figure 2-32 Closed Center Hydraulic Schematic

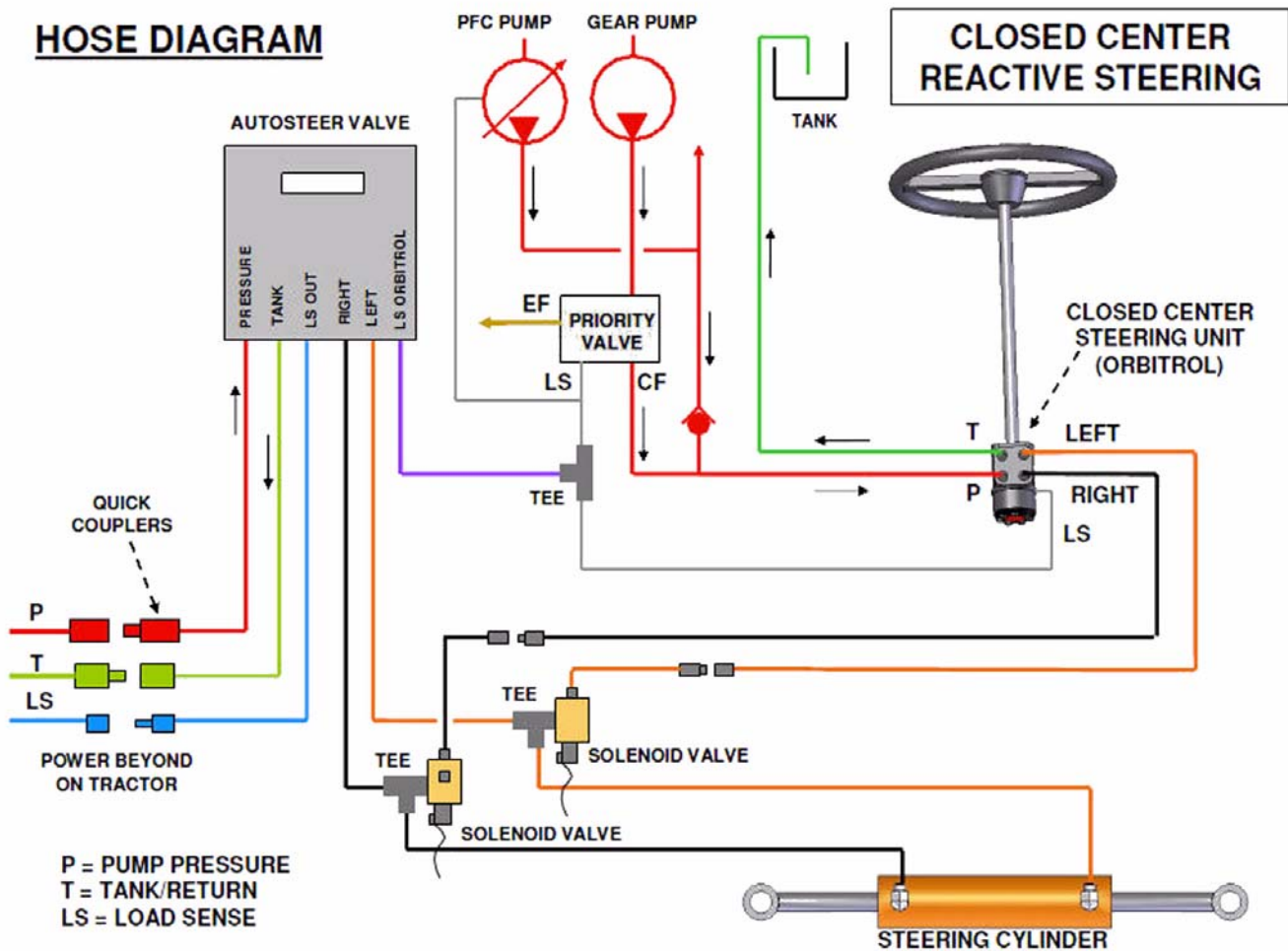
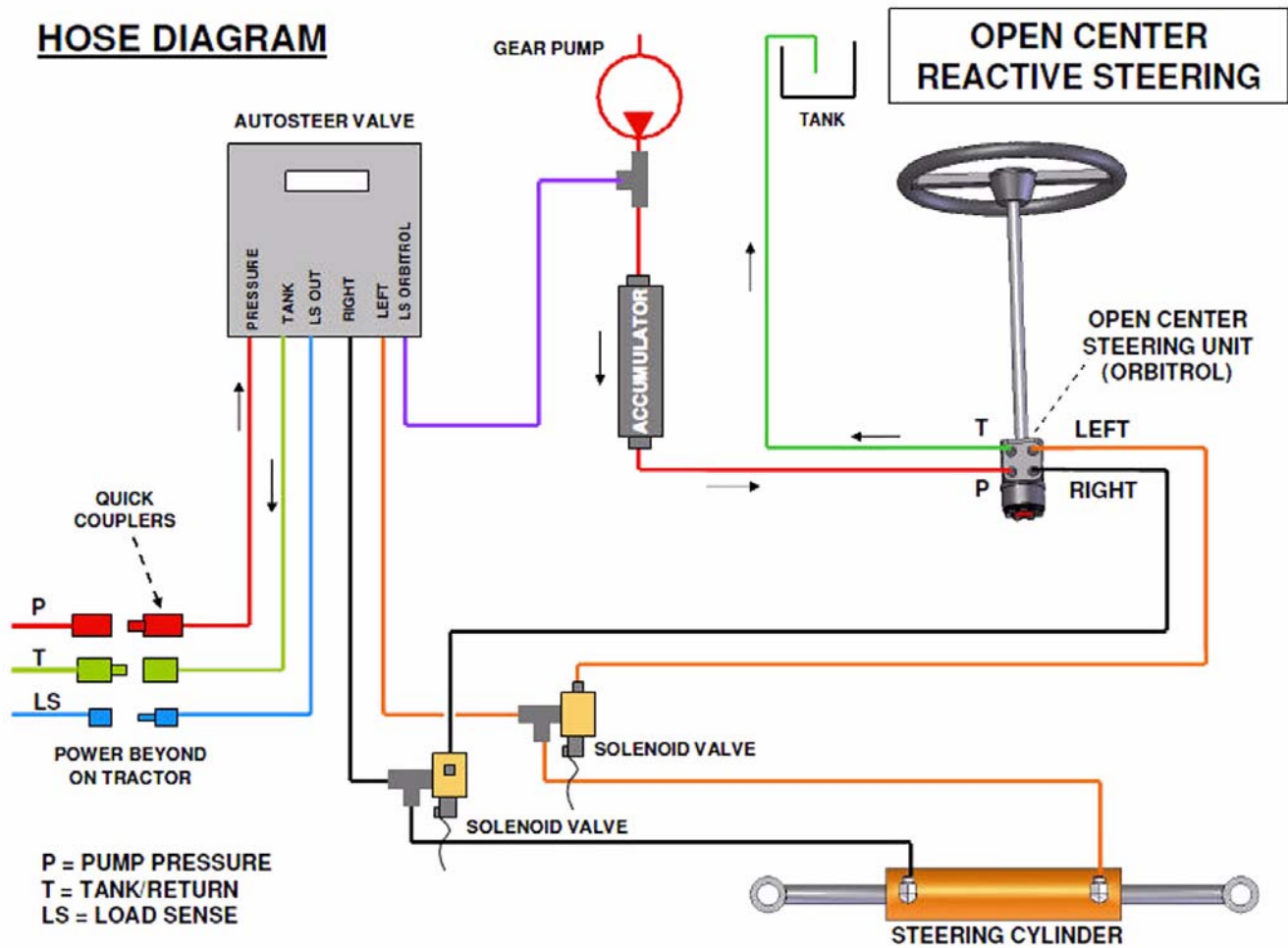


Figure 2-33 Open Center Hydraulic Schematic



Reactive Solenoid Connection

1. Install a short jumper hose between the Steering Valve RIGHT port and the right side solenoid tee adapter bottom. See *Figure 2-34*.

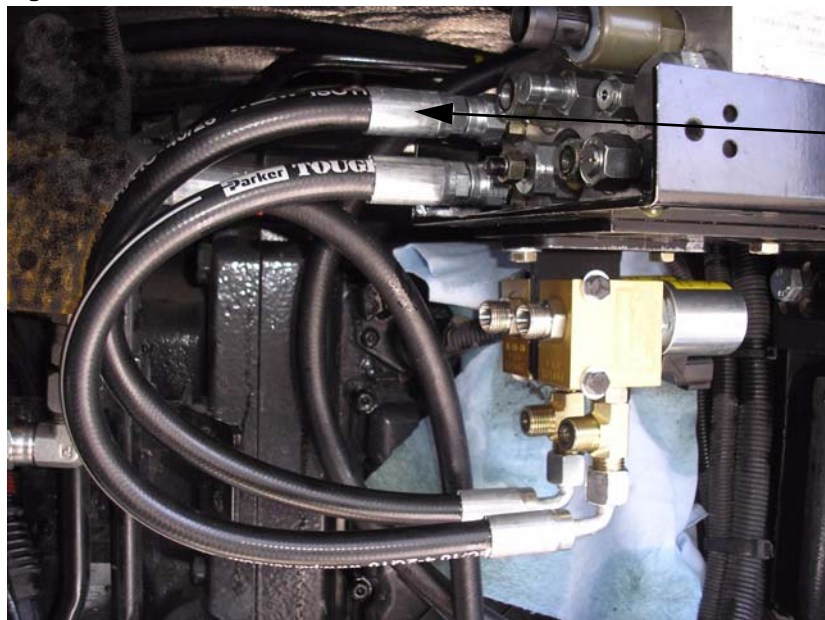
Figure 2-34 right Reactive Solenoid Hose Connection



Right Solenoid Hose

2. Install a short jumper hose between the Steering Valve LEFT port and the left side solenoid tee adapter bottom. See *Figure 2-35*.

Figure 2-35 Left Reactive Solenoid Hose Connection



Left Solenoid Hose

Power Beyond Connections

1. Assemble the Pressure hose by connecting the hose elbow fitting to the large male coupler using an ORB threaded adapter. See *Figure 2-36*.

Note: The pressure hose has a larger -8 ORFS hose fitting to connect to the valve.

Figure 2-36 Assemble Power Beyond Pressure Hose



2. Connect the Pressure hose opposite end to the Steering Valve pressure port. See *Figure 2-37*.

Note: The fitting is an -8 ORFS size fitting.

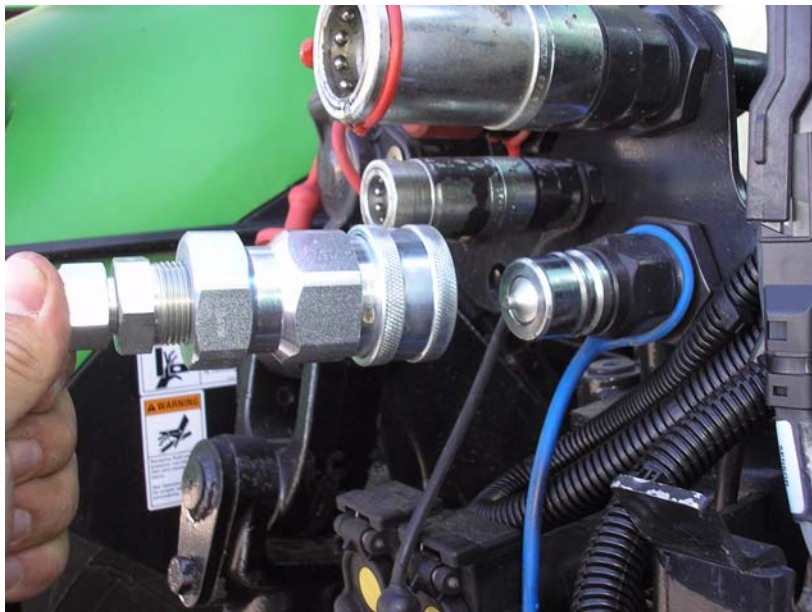
Figure 2-37 Steering Valve Pressure Hose Connected



Pressure Hose

3. Assemble the Tank hose by connecting the hose elbow fitting to the large female coupler using an ORB threaded adapter. See *Figure 2-38*.

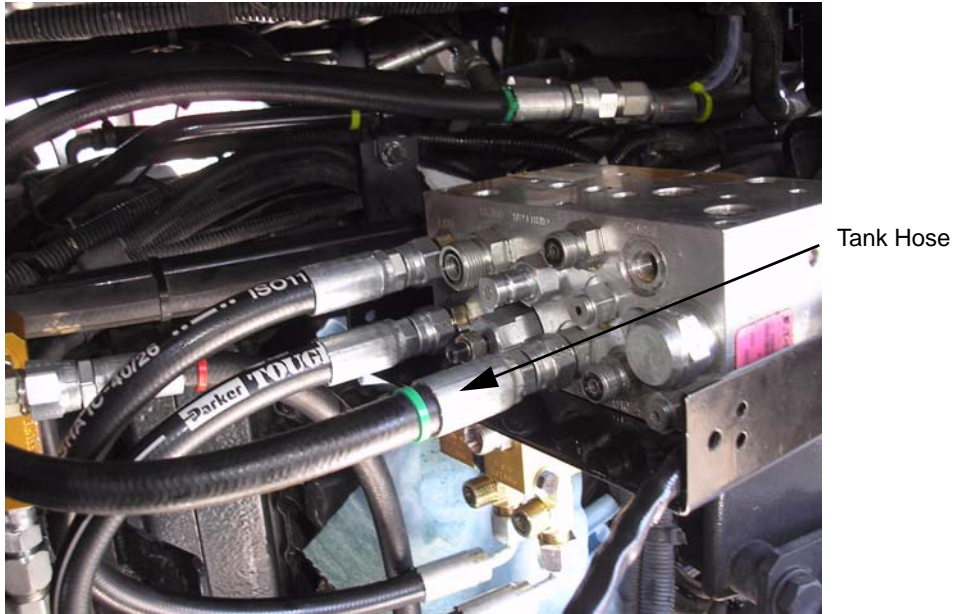
Figure 2-38 Power Beyond Tank Hose Connection



4. Connect the opposite Tank hose end to the Steering Valve Tank port. See *Figure 2-39*.

Note: The connection is a -6 ORFS size fitting.

Figure 2-39 Steering Valve Tank Hose Connection



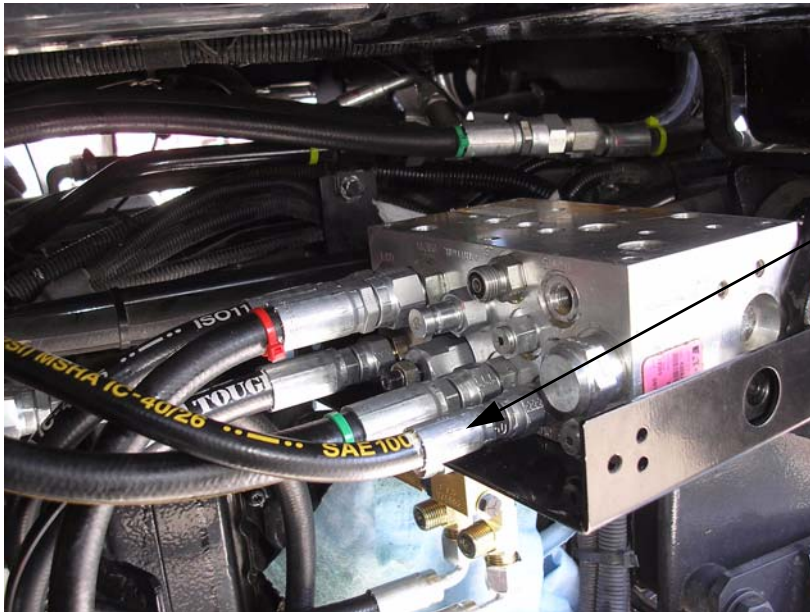
5. Assemble the Load Sense Out hose by connecting the hose elbow fitting to the small male coupler using an ORB threaded adapter. See *Figure 2-40*.

Figure 2-40 Power Beyond Load Sense Out Hose Connection



6. Connect the LS Out hose opposite end to the Steering Valve port labeled **LS OUT**. See *Figure 2-41*.

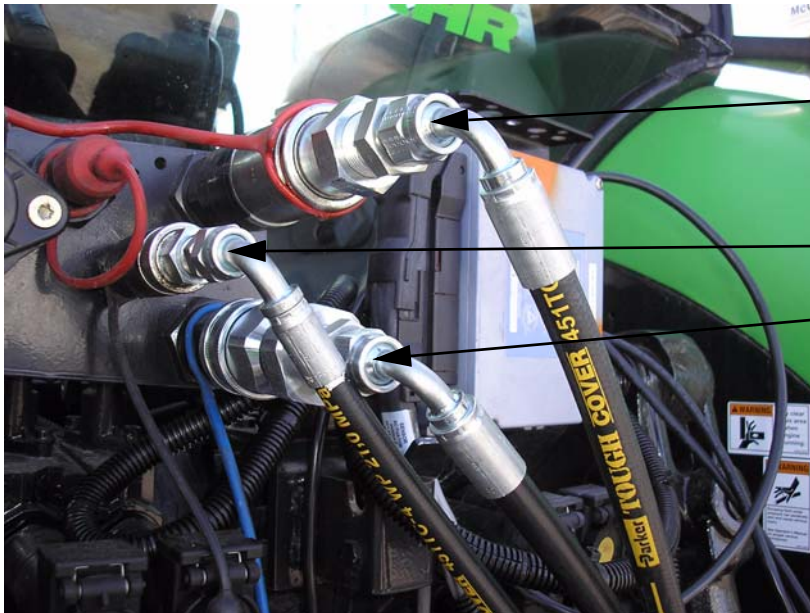
Figure 2-41 Steering Valve Load Sense Out Connection



Load Sense Out Hose Connected

7. The three Power Beyond quick couplers are now connected. See *Figure 2-42*.

Figure 2-42 Power Beyond Quick Couplers Connected



Pressure Connection

Load Sense Connection

Tank Connection

8. Route the three hoses under the cab towards the Steering Valve in a protected position.

Note: The hoses must not interfere with the 3-point hitch or other moving parts such as levers or cab suspension.

9. Secure all hoses with cable ties.

Load Sense Orbitrol Hydraulic Connection

There are two installation procedures for the Load Sense Orbitrol hydraulic connection. One procedure for Closed Center Orbitrol connections and one procedure for Open Center orbitrol connections.

- *Closed Center Orbitrol Load Sense Connection*
- *Open Center Orbitrol Load Sense Connection*

Closed Center Orbitrol Load Sense Connection

1. Locate the Load Sense hose coming down from the Orbitrol and trace it until it reaches the Steering Priority Valve or a Tee adapter. See *Figure 2-43*.
2. Disconnect this LS hose from the Priority Valve or Tee and install a kit provided small run tee adapter.
3. Connect a small diameter hose from this run Tee and route it towards the Steering Valve.

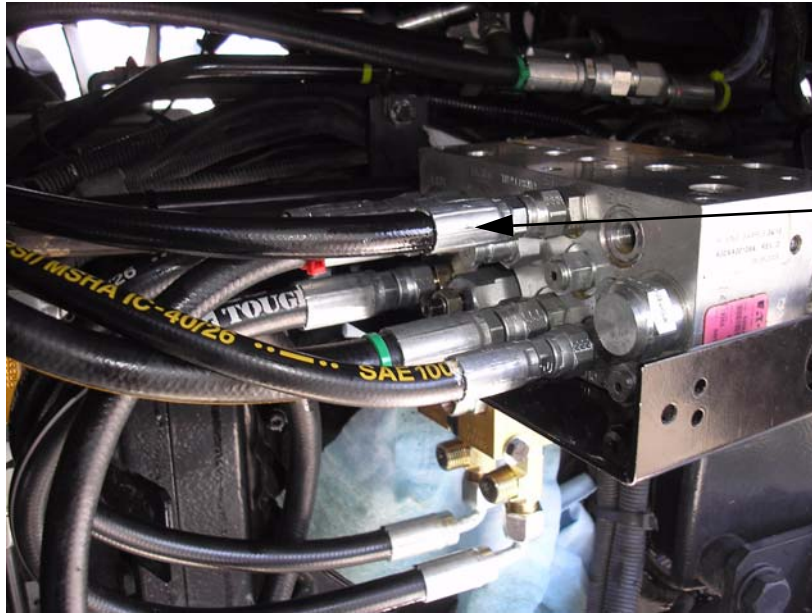
Figure 2-43 Load Sense Hose Location



4. Connect the opposite end of the small diameter hose to the Steering Valve port labeled **LS ORBITROL**.

Note: Alternatively you can connect this hose to the pressure hose coming from the gear pump as described in the Open Center instructions. This connection may be easier to install on some machines when the Orbitrol LS hose is not easy to reach. The objective is to always connect the LS Orbitrol hose to a hydraulic line that receives a pressure spike when the driver turns the steering wheel.

Figure 2-44 Steering Valve LS Orbitrol Connection



LS Orbitrol Connection

5. This completes the Load Sense connection. Proceed to the *Right and Left Steer Hose Connection* section on page 45.

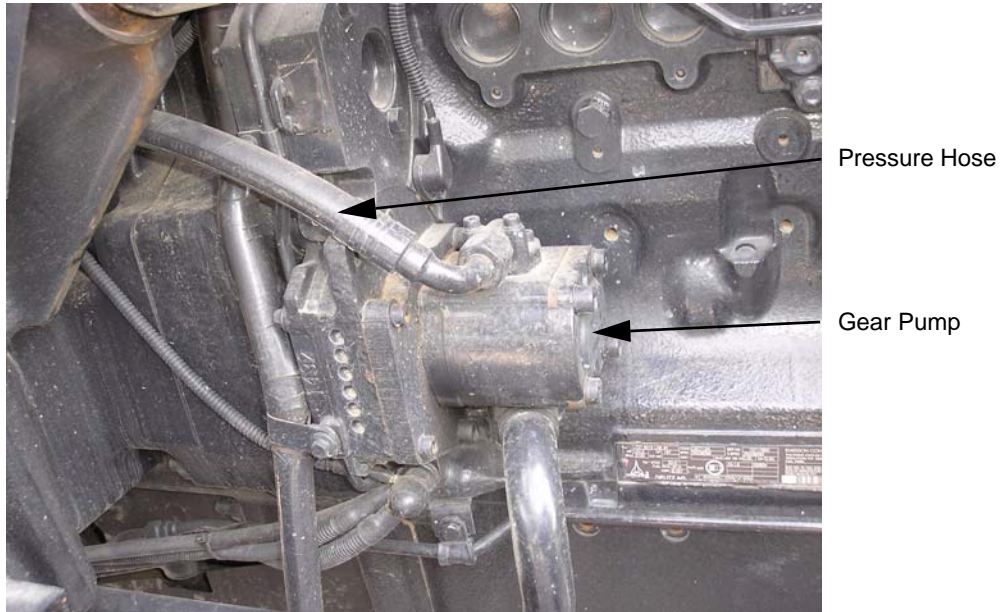
Open Center Orbitrol Load Sense Connection

An extra hose must be connected to the tractor to enable AutoSteer kick-out when the driver turns the steering wheel. This hose brings a pressure signal from the Orbitrol Pressure hose towards the AutoSteer valve enabling the Pressure Transducer to detect a pressure spike when the driver turns the steering wheel.

1. Locate the steering Pressure hose connected to the gear pump on the engine right side. See *Figure 2-45*.

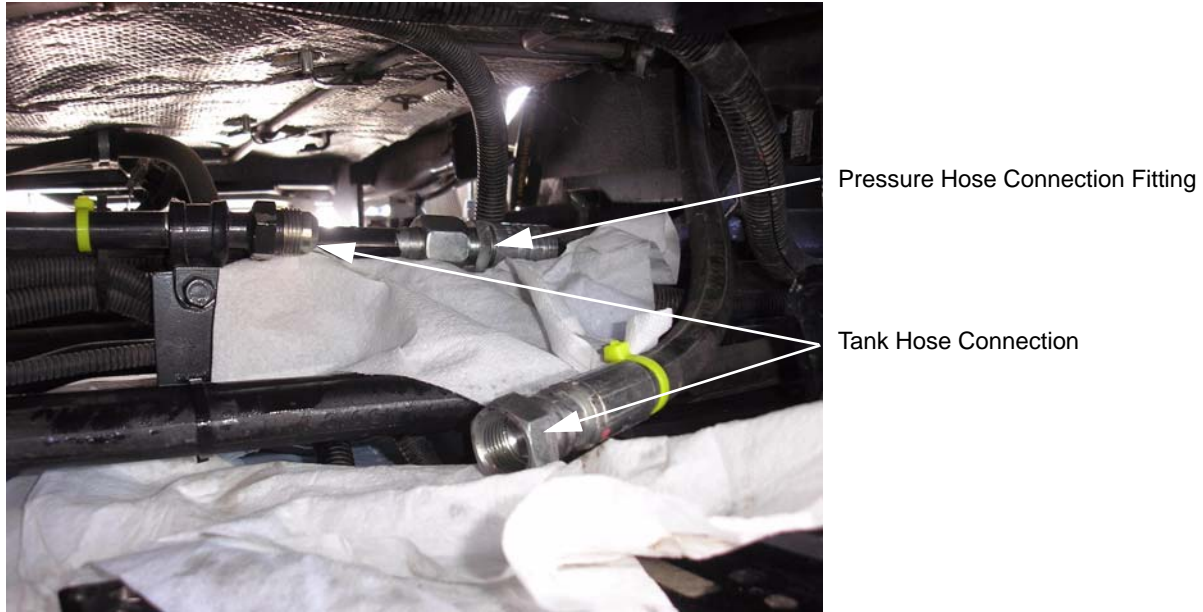
Note: Follow this pressure hose to the accumulator on the transmission right-side and then under the cab where the steel pressure line connects to a rubber hose going to the steering Orbitrol.

Figure 2-45 Pressure Hose Connection



2. Disconnect the Orbitrol pressure hose from the steel line on top of the transmission right side. See *Figure 2-46*.
3. Install a run tee provided and reconnect the Orbitrol pressure hose.
4. You can disconnect the Tank hose as shown located in front of the Pressure hose for easier access to the Pressure hose. See *Figure 2-46*.

Figure 2-46 Disconnecting the Pressure Hose



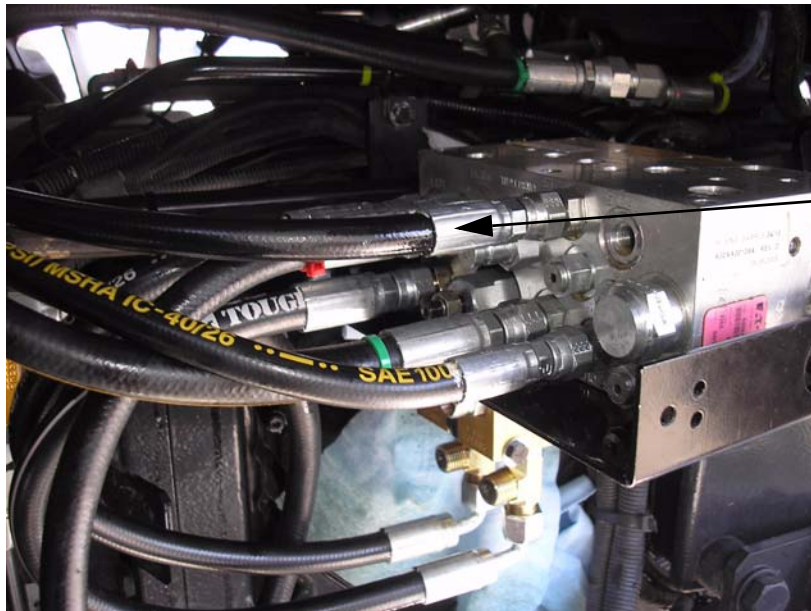
5. Reconnect the Pressure hose.

Note: Use an elbow adapter for better hose routing if necessary.

6. Install the JIC 10-4 reducer to the run Tee or elbow side.
7. Connect the Load Sense hose with the -4 JIC elbow fitting to this run Tee reducer.
8. Connect the Load Sense hose opposite end to the Steering Valve port labeled **LS ORBITROL**. See *Figure 2-47*.

Note: This hose enables the AutoSteer Pressure Transducer to measure the pump pressure in the manual steering circuit.

Figure 2-47 AutoSteer Load Sense Orbitrol Connection



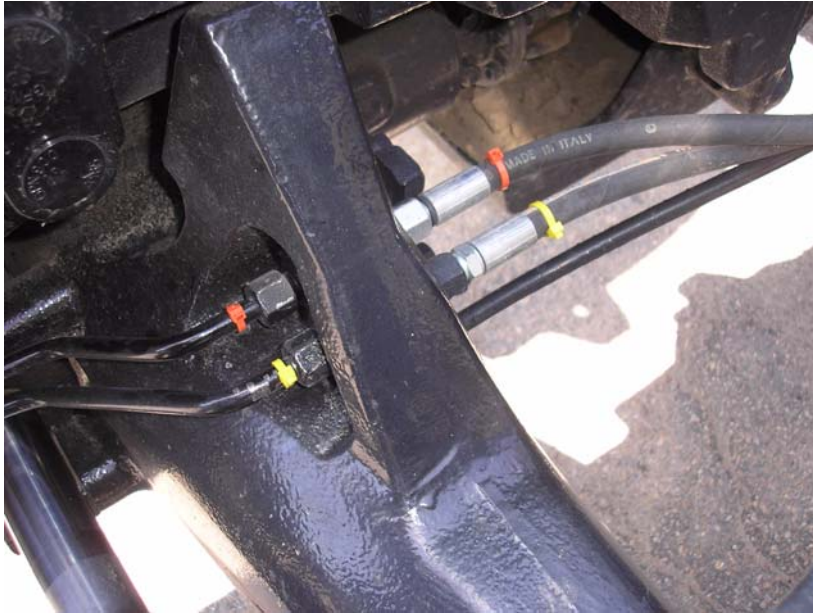
Load Sense Orbitrol Connection

Right and Left Steer Hose Connection

1. Identify the two steer hoses connected to the front axle left-side steering cylinder lines. See *Figure 2-48*.
2. Identify each hose using a colored cable tie and identify the corresponding steel line using the same color.

Note: Color coding the hoses ensures hose identification after they are disconnected and enables correct AutoSteer valve connection.

Figure 2-48 Steer Lines Hoses on the Axle



3. Remove all the hose clamps along the engine left-side. Use a 13mm socket wrench. See *Figure 2-49*.
4. Keep the hose clamps for securing the new Autosteer hoses.

Figure 2-49 Removing Hose Clamps



5. Loosen any existing cables attached to the existing steering hoses. Use a wire cutter to remove cable ties while avoiding possible damage to the cables. See *Figure 2-50*.

Note: Handle the existing cables and connectors carefully to avoid damage. Pay special attention when cutting the cable ties next to the cables.

Figure 2-50 Cutting Steering Hose Cable Ties



Right and Left Steer Hose Connection

6. Place a collection pan or bucket under the front axle to collect the oil when the hoses are disconnected.
7. Disconnect the two hoses from the front axle and cover the two hose ends with the metric cap and plug provided in your hose kit. See *Figure 2-51*.

Note: Covering the hose connectors avoids oil leakage and hose contamination while they are being handled.

Note: The two hoses have different threads; one is male and the other is female. Use two wrenches to hold the hex nut on the steel line while the hose fitting is loosened.

Figure 2-51 Disconnecting the Steering Hoses



8. Pull the two steer hoses back under the cab and route the ends towards the AutoSteer valve.

Note: If the two factory steer hoses do not reach the AutoSteer valve use the two kit provided 18" (257mm) extender hoses with metric fittings. This hose configuration may be required on the TTV-630 depending on the factory options installed.

Note: Ensure you route the hoses so they do not catch on cables, connectors or other hoses under the cab.

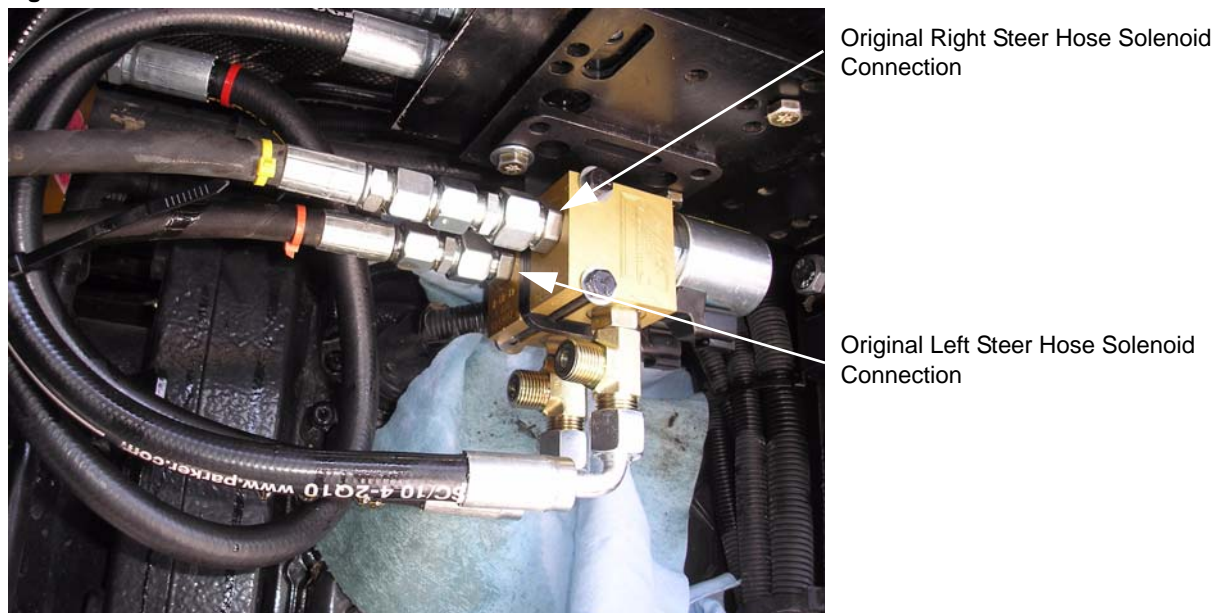
9. Observe how the hoses are routed down the cab left-side towards the front axle so you can use the same hose routing with the two new AutoSteer hoses to be installed later.

Note: The correct hose routing is important to protect the hoses and avoid unnecessary loops.

10. Remove the cap and plug previously installed on the hose ends and connect the two hose ends to the reactive solenoids as shown using the kit provided metric adapters. See *Figure 2-52*.

Note: The hoses have different threads and require different threaded adapters. For convenience, connect the right steer hose to the right-side solenoid and the left steer hose to the left-side solenoid.

Figure 2-52 Steer Hoses Connected to Solenoids



Right and Left Steer Hose Connection

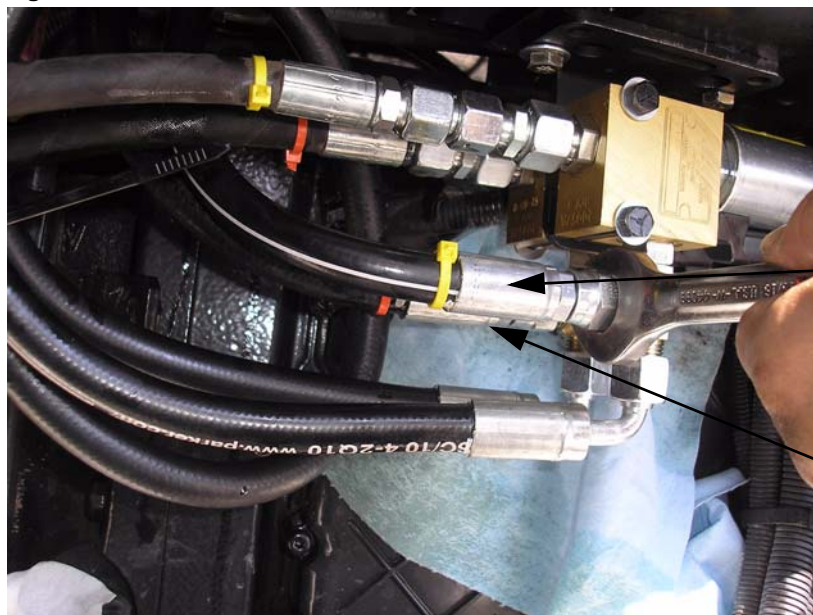
11. Identify two new right and left steer hoses with cable ties at both ends using the same color scheme used for the original steer hoses and matching the thread gender.
12. Install the metric cap and plug to the hose ends and route the two hoses between the front axle and the two solenoid valves.

Note: Follow the same hose routing as the original steer hoses down and along the vehicle left-side.

13. Connect the two hoses to the Tee adapters on the solenoid valves. See *Figure 2-53*.

Note: Refer to the hose diagram for correct hose connections.

Figure 2-53 New AutoSteer Hose Connection to Solenoids



AutoSteer Right Steer Hose Connection

AutoSteer Left Steer Hose Connection

14. Connect the two new AutoSteer hose ends to the front axle connectors matching the colors. See *Figure 2-54*.

Figure 2-54 AutoSteer Right and Left Steer Hoses Connected



15. Secure the Right and Left steer hoses to the engine left-side using the longer kit provided hex bolts. See *Figure 2-55*.

16. Replace any cable ties previously removed from cables during installation.

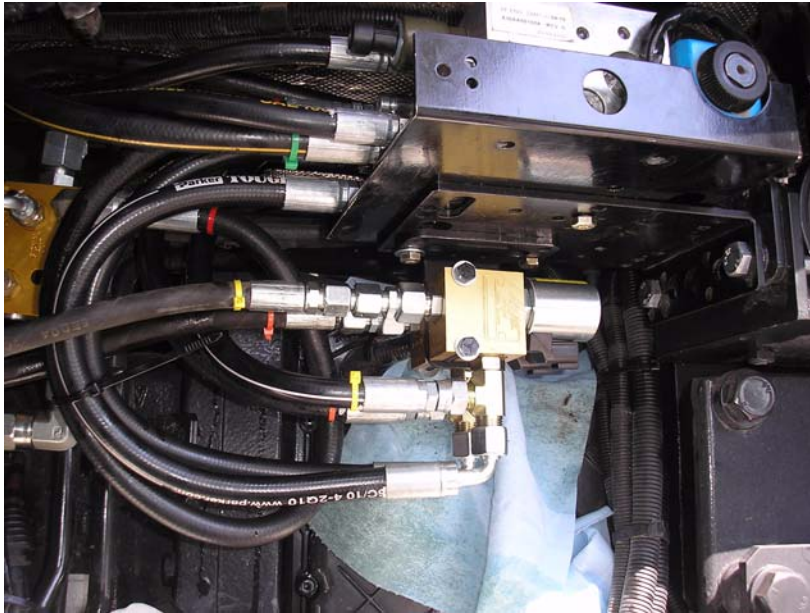
Figure 2-55 Hose Clamps Replaced



17. Verify all hoses have been installed according to the appropriate hydraulic schematic provided for either the Closed Center or Open Center Orbitrol steering systems.
18. Verify all hoses fittings and connections are tight.
19. Ensure all hoses are routed in a protected position and are secured with cable ties.

Note: The hoses must not rub against moving parts such as levers and cab suspension and must not contact hot parts such as exhaust manifolds.

Figure 2-56 Steering Valve Hoses Connected



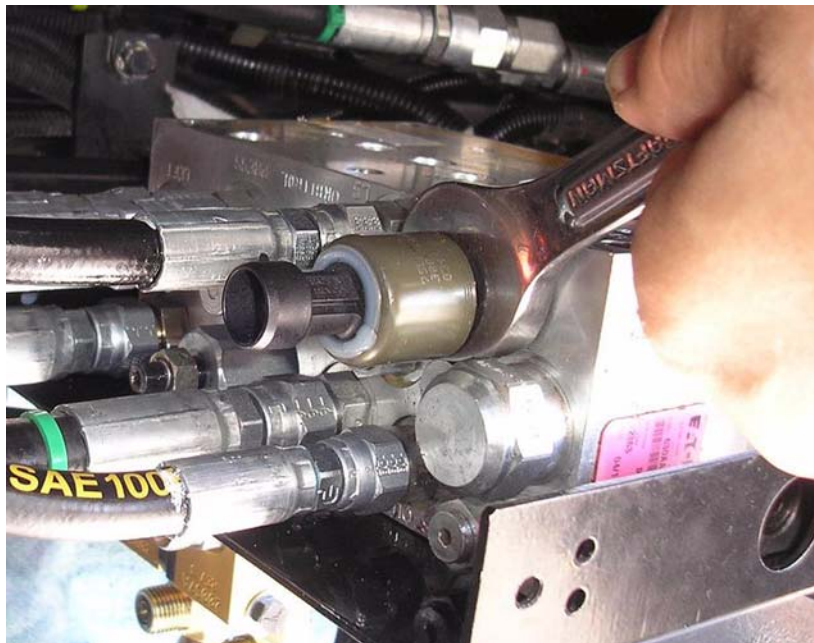
20. The Steering Valve is now installed and hydraulically connected.

Pressure Transducer Installation

1. Install the threaded Pressure Transducer into the port identified as "TRANS."
2. Tighten the Pressure Transducer using a 3/4" wrench. See *Figure 2-57*.

Note: Do not overtighten the Pressure Transducer.

Figure 2-57 Pressure Transducer Installation



Steering Valve Checklist

1. Ensure the bolts mounting the Steering Valve are securely tightened. ☐
2. Ensure the Steering Valve has been configured with correct plugs and orifices. ☐
3. Ensure the Pressure hose is connected to correct AutoSteer Valve and Power Beyond ports. ☐
4. Verify the Tank hose is connected to correct AutoSteer Valve and Power Beyond ports. ☐
5. Verify the Load Sense hose is connected to correct AutoSteer valve and Power Beyond ports. ☐
6. Verify the Right Steer solenoid hose is connected. ☐
7. Verify the Right steering cylinder hose is connected. ☐
8. Verify the Left steer solenoid hose is connected. ☐
9. Verify the Left steering cylinder hose is connected. ☐
10. Verify all the hose connections match the appropriate hose diagram. ☐
11. Verify all hose connections are tight. ☐
12. Verify the Pressure Transducer is installed. ☐
13. Verify all hoses are routed in a protected position and secured with cable ties. ☐

Wheel Angle Sensor (WAS) Installation

This **Wheel Angle Sensor Installation** chapter information is provided in the following sections:

- *Installing Wheel Angle Sensor Hardware*
- *Cut the Wheel Angle Sensor Rods to Length*
- *Assemble the Linkage Rod Hardware*
- *Attaching and Adjusting Wheel Angle Sensor Linkage Rods*

Note: The Wheel Angle Sensor is optional equipment and is not provided with the installation kit. The Wheel Angle Sensor installation instructions are provided for special installations, when required.

If additional on-line performance is required, a Wheel Angle Sensor is available for this vehicle. The decision to use this option are left up to the installer and customer.

Installing Wheel Angle Sensor Hardware

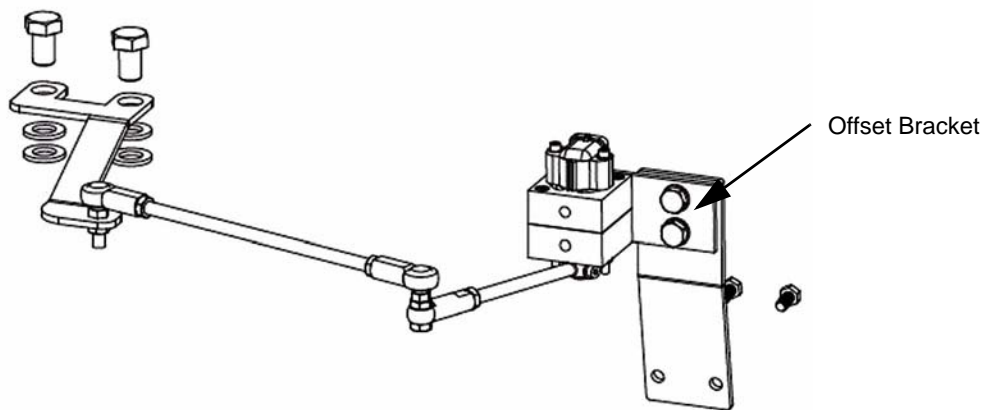
Note: Some models such as the TTV-630 use a heavy duty front axle requiring a slightly different Wheel Angle Sensor mounting position. Use the appropriate mounting procedure as listed below. After mounting the Wheel Angle Sensor hardware the remaining Wheel Angle Sensor installation procedures are identical.

- *Heavy Duty Front Axle Mounting*
- *Normal Front Axle Mounting*

Heavy Duty Front Axle Mounting

Figure 3-1 shows the heavy duty front axle Wheel Angle Sensor components.

Figure 3-1 Wheel Angle Sensor Assembly



1. Assemble the Wheel Angle Sensor. See *Figure 3-1*.

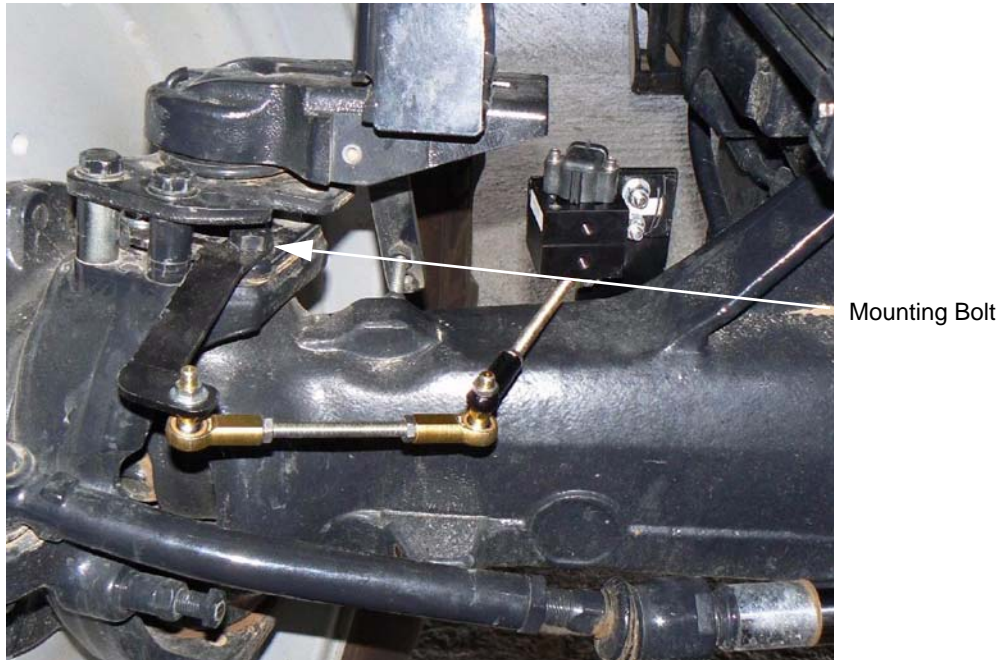
Note: Add the extra offset bracket provided to move the Wheel Angle Sensor towards the wheel to clear the angled axle feature.

2. Secure the offset bracket to the vertical bracket using two kit provided M10 bolts, nuts and washers.

3. Install the brackets and connect the linkage rods. See *Figure 3-2*.

Note: Use existing bolts to secure the linkage bracket.

Figure 3-2 Brackets Installed

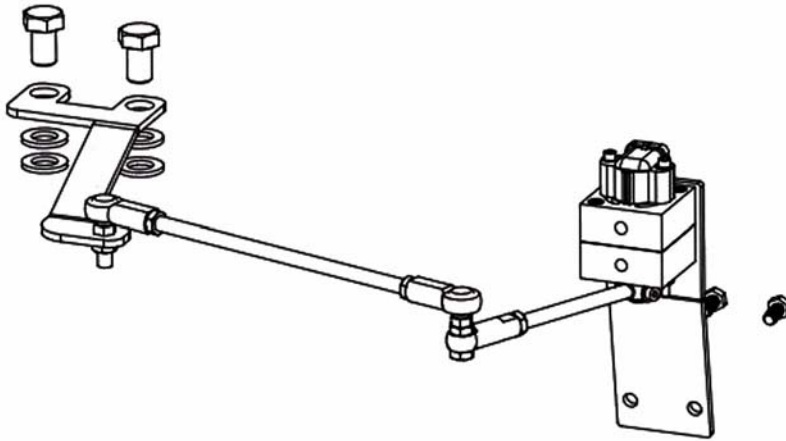


4. Proceed to the *Cut the Wheel Angle Sensor Rods to Length* section on page 65 of this chapter after installing the Heavy Duty Front Axle brackets.

Normal Front Axle Mounting

Figure 3-3 shows the normal front axle Wheel Angle Sensor components.

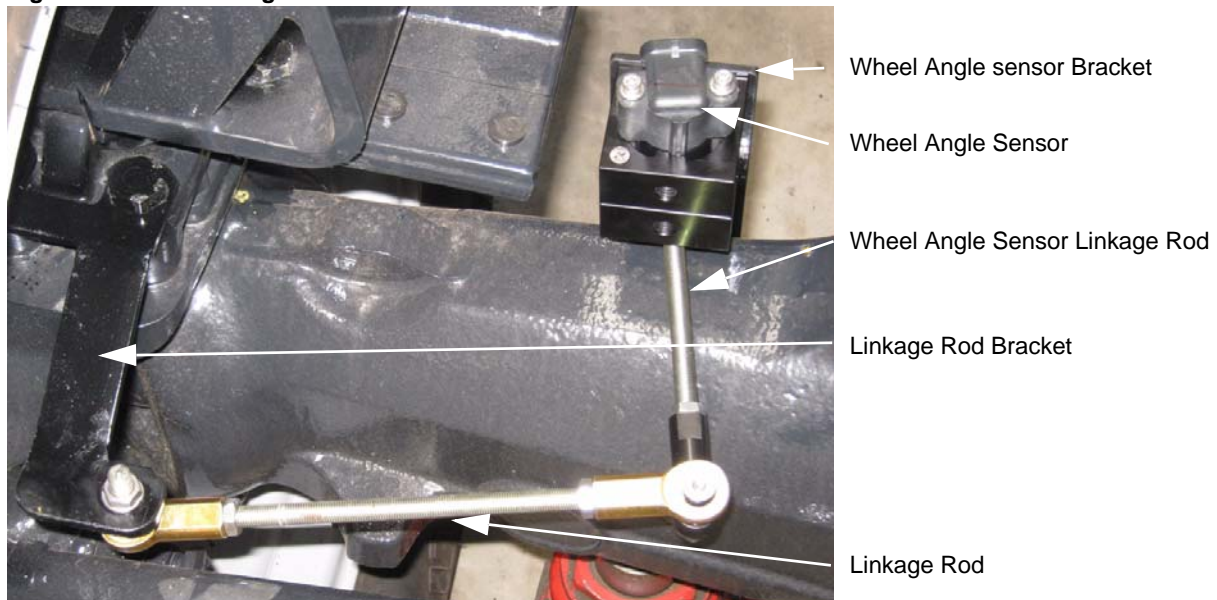
Figure 3-3 Wheel Angle Sensor Components



1. Identify the Wheel Angle Sensor location. See *Figure 3-4*.

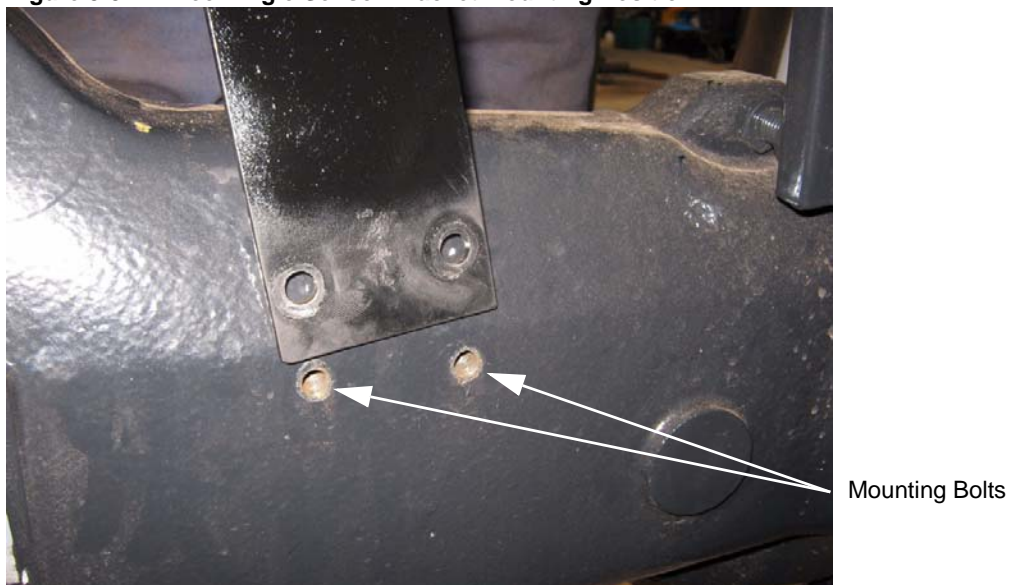
Note: The Wheel Angle Sensor is mounted on the front axle right-side. The Wheel Angle Sensor bracket is bolted to the axle housing and the linkage bracket is bolted to the final drive housing. See *Figure 3-4*.

Figure 3-4 Wheel Angle Sensor Location



2. Locate the two threaded holes in the front axle housing. Remove the plastic plugs protecting the holes. See *Figure 3-5*.

Figure 3-5 Wheel Angle Sensor Bracket Mounting Position



3. Attach the Wheel Angle Sensor bracket to the front axle using two kit provided M8 x 20 bolts.
4. Tighten the bolts using a 13mm wrench. See *Figure 3-6*.

Figure 3-6 Wheel Angle Sensor Bracket Bolted



5. Attach the Wheel Angle Sensor to bracket.

Note: Orient the Wheel Angle Sensor so the plug is facing the vehicle rear. See *Figure 3-7*.

6. Tighten bolts with a 9/16" wrench. See *Figure 3-7*.

Figure 3-7 Wheel Angle Sensor Attached to Bracket



7. The linkage bracket is bolted to the front mudguard support using the two kit provided M16 bolts. See *Figure 3-8*.

Note: If there is no vehicle mudguard assembly, the linkage bracket is mounted using the two kit provided M16 x 25 bolts.

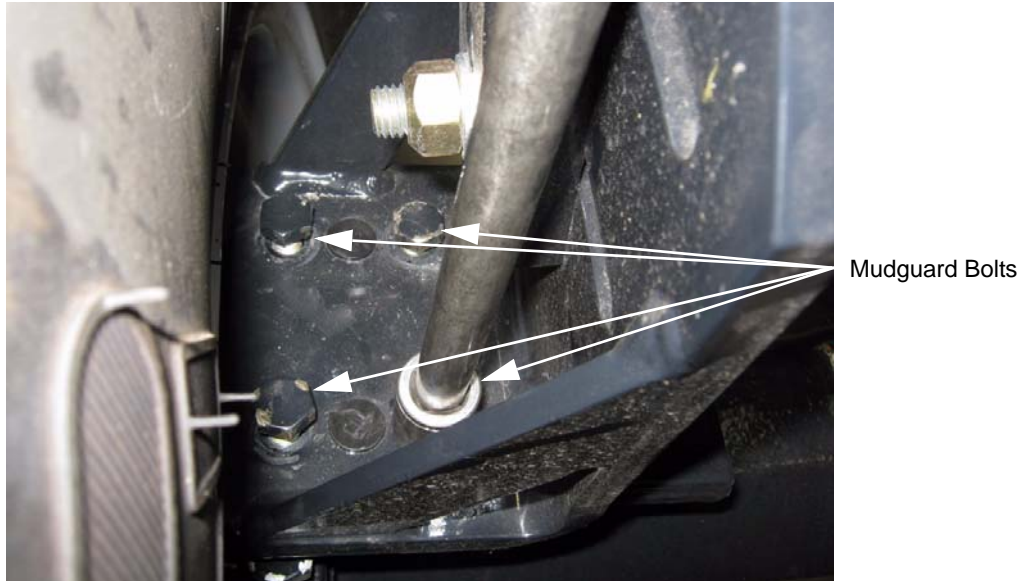
Figure 3-8 Linkage Bracket Mounting Position



8. Loosen the four bolts holding the mudguard to the mudguard support using a 19mm socket ratchet and extension.

Note: Do not completely remove bolts. See *Figure 3-9*.

Figure 3-9 Loosen Mudguard Support Bolts



9. Loosen the mudguard bolts enough to get the mudguard support bolts out.
10. Remove the two front mudguard support bolts using a 24mm socket and breaker bar. See *Figure 3-10*.

Figure 3-10 Remove Bolts from the Mudguard Support



11. Mount the linkage bracket, reinstall the mudguard support bolts and tighten the bolts. See *Figure 3-11*.

Figure 3-11 Install Wheel Angle Sensor Bracket on Mud Guard Bracket



Cut the Wheel Angle Sensor Rods to Length

Note: Before cutting the linkage rods, verify the wheel angle sensor brackets will attach to the vehicle as shown in this manual and they are attached the correct distance from the reference points shown. If this is not possible, do not cut the rods until it is determined if these lengths work for your installation.

Note: Due to possible variations in the mounting positions, these measurements could be different. These measurements are provided as a reference only. The installer is responsible for ensuring the rods are cut to the proper length.

Note: It is advisable to attach a nut on the side of the metal rod that is going to be kept in order to clean the threads after the cut has been made.

1. Measure and mark the two linkage rods for cutting, according to the length shown in *Table 3-1*.

Note: *Figure 3-12* shows the linkage rod measurement points.

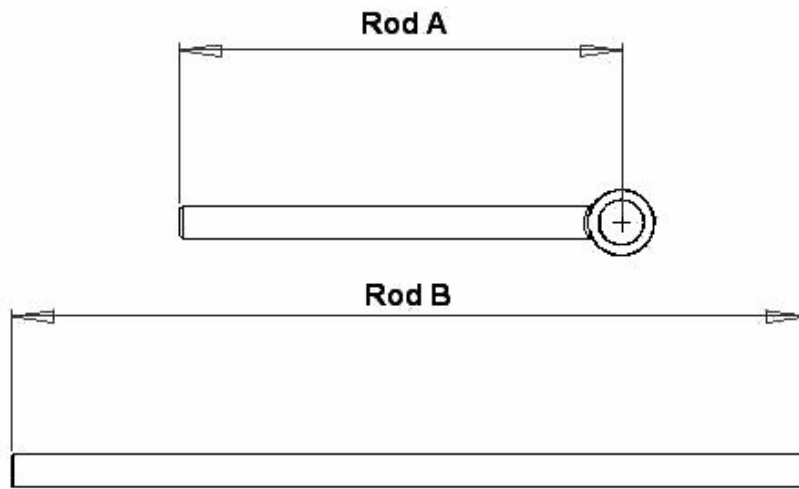
Table 3-1 Linkage Rod Cut Lengths (Standard Axle)

Item	Length
Rod A	5.11 inches (130mm)
Rod B	7.28 inches (185mm)

Table 3-2 Linkage Rod Cut Lengths (Heavy Duty Axle)

Item	Length
Rod A	5.3 inches (135mm)
Rod B	4.7 inches (120mm)

Figure 3-12 Linkage Rod Cut Length Measurement Points



2. Place the Linkage rod in a bench vise and cut to length using a hack saw. See *Figure 3-13*.

Figure 3-13 Cutting Linkage Rod

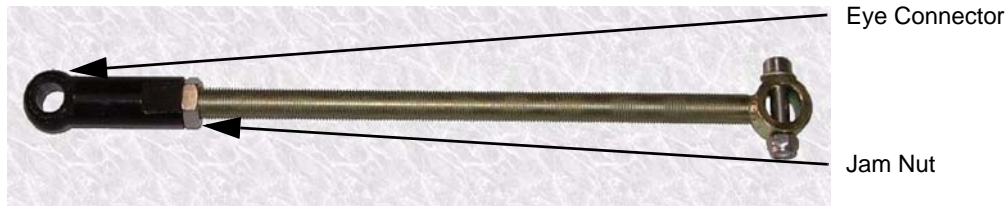


Assemble the Linkage Rod Hardware

Note: The “after-assembly” center-to-center lengths of each linkage rod are shown in *Table 3-3*. *Figure 3-16* shows the measurement points for the assembled linkage rods.

1. Attach a jam nut to the end of Rod A.
2. Connect the eye connector to the Wheel Angle Sensor rod end as shown in *Figure 3-14*.

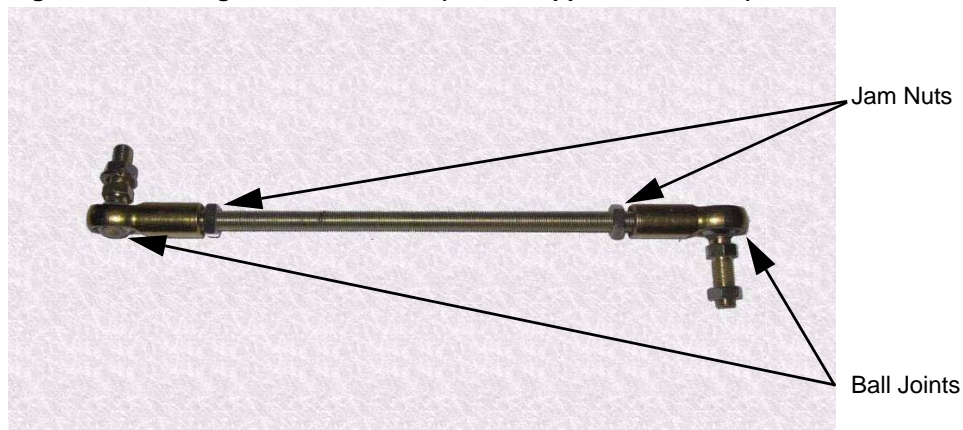
Figure 3-14 Rod A Assembled



3. Attach the jam nuts to each end of the linkage Rod B.
4. Attach the ball joints to both ends of the linkage rod as shown in *Figure 3-15*.

Note: The bolts for the ball joints should be facing the opposite direction for this installation. See *Figure 3-15*.

Figure 3-15 Linkage Rod Assembled (bolts in opposite direction)



Note: The “after-assembly” center-to-center lengths of each linkage rod are shown in *Table 3-3*. *Figure 3-16* shows the measurement points for the assembled linkage rods.

Note: Before connecting the steering rods and turning the steering axle, verify these lengths work and the sensor will not be damaged.

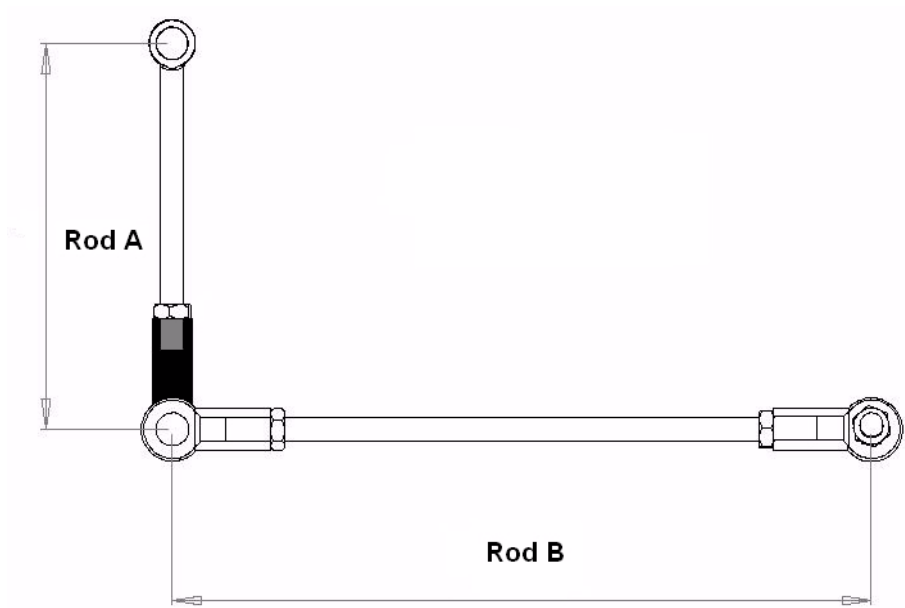
Table 3-3 Assembled Linkage Rod Length (Standard Axle)

Item	Length
Rod A	6.1 inches (155mm)
Rod B	9.25 inches (235mm)

Table 3-4 Assembled Linkage Rod Length (Heavy Duty Axle)

Item	Length
Rod A	6.3 inches (160mm)
Rod B	6.7 inches (170mm)

Figure 3-16 Assembled Linkage Rod Measurement Points

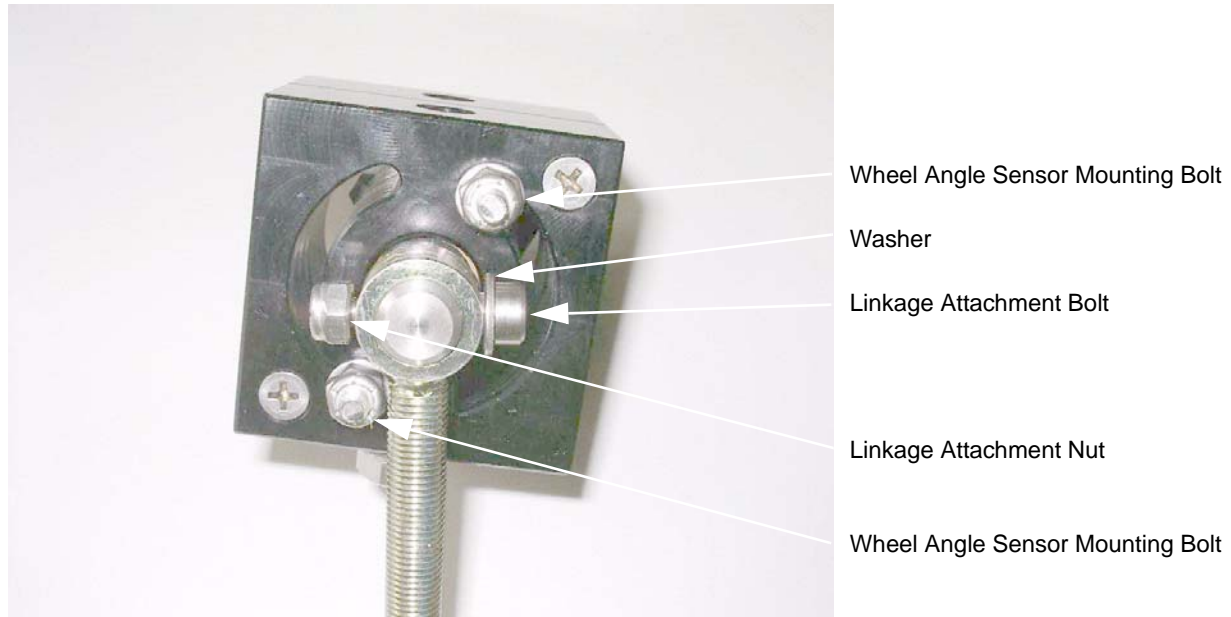


Attaching and Adjusting Wheel Angle Sensor Linkage Rods

1. Attach the Wheel Angle Sensor linkage rod to the Wheel Angle Sensor. See *Figure 3-17*.

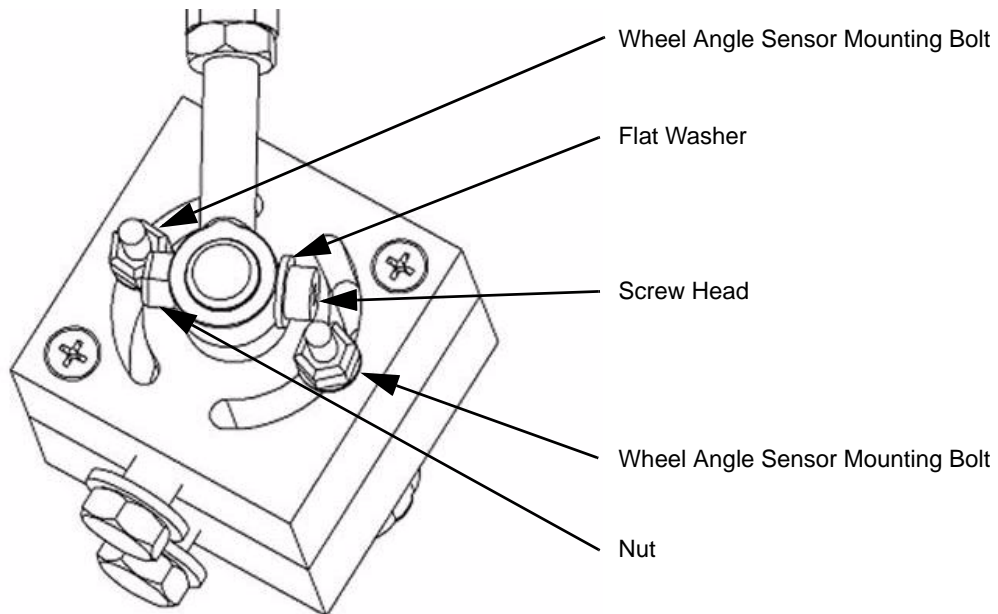
Note: Leave the Wheel Angle Sensor mounting bolts loose so the sensor can be rotated after installation.

Figure 3-17 Attaching the Linkage Arm to the Sensor (shown on bench)



2. Ensure a flat washer is placed under the screw head when attaching the linkage rod to the sensor shaft. See *Figure 3-18*.

Figure 3-18 Washer on Shaft Screw



Note: The washer should be on the assembly bolt head side and not the nut side.

Note: Do not turn the steering system or drive the vehicle before the Wheel Angle Sensor has been adjusted. The potentiometer can only rotate a maximum of 180 degrees. If the potentiometer is rotated beyond its mechanical stops, it will be permanently damaged. Tighten the Wheel Angle Sensor rod with a 3/8" wrench and 1/8" Allen wrench. See *Figure 3-19*.

3. Mount the Wheel Angle Sensor to the bracket using a 9/16" wrench.
4. The linkage rod should aim toward the vehicle front. See *Figure 3-19*.


Figure 3-19 Wheel Angle Sensor Rod Aiming Towards the Vehicle Front



5. Attach the linkage rod to the linkage bracket and tighten the ball joint to the bracket with a 1/2" and 9/16" wrench. See *Figure 3-20*.

Figure 3-20 Attach Linkage Rod to Linkage Bracket



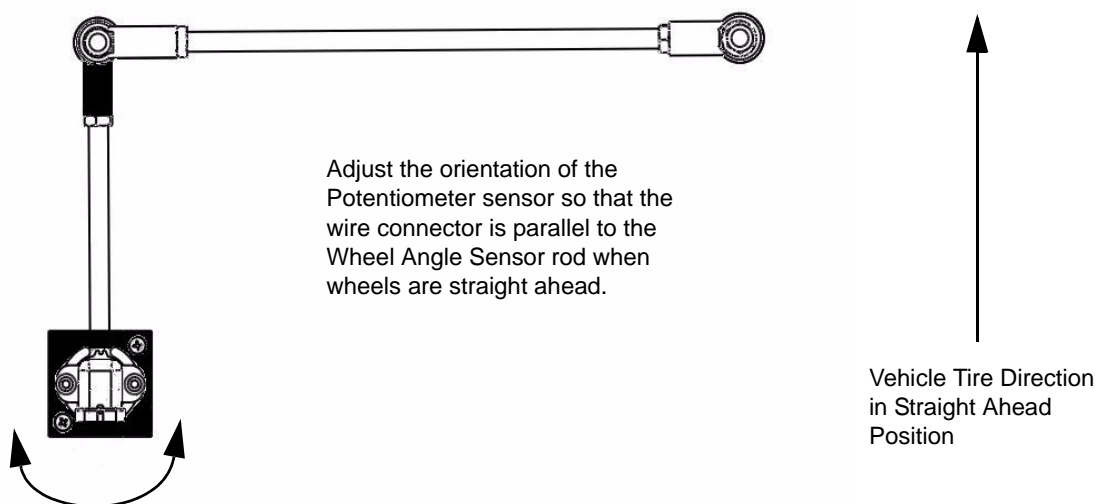
	<p style="text-align: center;">⚠ WARNING</p> <p>Always shut down the vehicle when working around the steering axle and checking and adjusting the Wheel Angle Sensor rod lengths. The steering axle could move suddenly and cause severe injury or death.</p>
---	--

Note: Never attach the linkage rods to Wheel Angle Sensor rod and turn the steering wheels manually or automatically until the fit has been verified. The linkage rods must remain apart while the steering wheels are turned to the maximum right and left positions and then temporarily attached at these positions. Failure to do this may cause the Wheel Angle Sensor or vehicle to become damaged.

Note: After the linkage rods are assembled in the following steps, they should move freely without touching any other parts and without overextending. Make any necessary adjustments to the linkage rods if there is an interference problem.

6. With the linkage rods disconnected, manually turn the steering wheel so the wheels are centered (the vehicle will travel straight ahead when moving).
7. Temporarily attach the linkage rods.
8. Rotate the Wheel Angle Sensor potentiometer on top of the mounting block so that the plastic wire connector is parallel to the Wheel Angle Sensor rod. See *Figure 3-21*.

Figure 3-21 Adjust Potentiometer Angle to Match Straight Ahead



9. After the potentiometer has been adjusted, tighten the potentiometer bolts with a 3/8" wrench and 5/32" Allen wrench.
10. Disconnect the linkage rods and turn the steering wheel manually to the full left position.
11. Reattach the linkage assembly and verify the sensor or rods will not be damaged. Adjust the rod lengths as necessary. See *Figure 3-22*.

Figure 3-22 Full Left Wheel Angle Sensor Test



12. Disconnect the linkage rods and turn the steering wheel manually to the full right position.
13. Reattach the linkage assembly and verify the sensor will not be damaged. See *Figure 3-23*.
14. Adjust the linkage rod lengths as necessary.

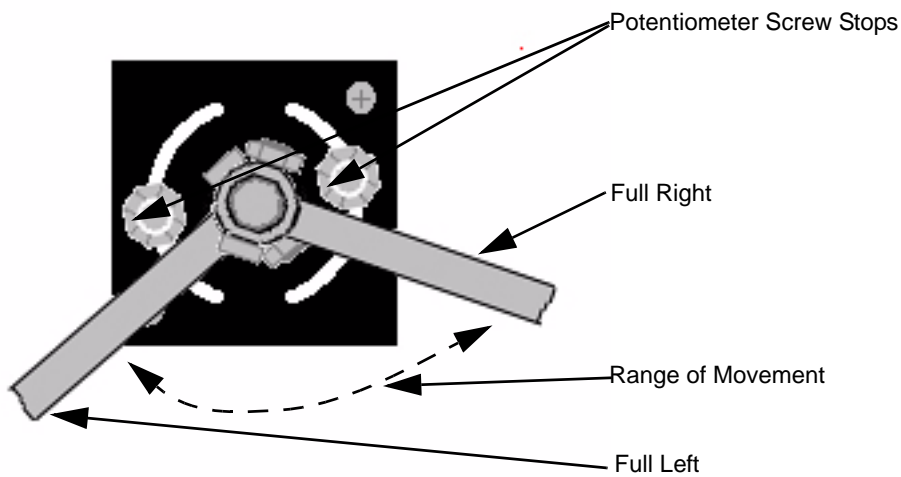
Figure 3-23 Full Right Wheel Angle Sensor Test



15. Repeat *Step 6* through *Step 14* until the rod lengths have been adjusted and the potentiometer is centered to get the maximum sensor movement.

Note: The maximum movement is reached when the Wheel Angle Sensor rod sweeps from approximately 3/16 inch (5mm) from both bolt heads holding the potentiometer on to the block when the wheels are turned to the maximum right and left positions. See *Figure 3-24*.

Figure 3-24 Maximum Sensor Movement (as seen from bottom)



Note: An Ohm meter can also be used to determine if there is enough sensor movement. Connect the Ohm meter to pins A and B of the Wheel Angle Sensor. Measure the Ohm reading at the maximum left and right position. After subtracting the smaller number from the larger number, there should be at least a 3.75 kilohms change. The reading should also never go below 1.6 or higher than 6.6 kilohms as this is reaching the limits of the potentiometer and could damage the sensor.

- 16.** Once all the adjustments are complete, tighten all lock nuts and bolts on the linkage and Wheel Angle Sensor rods.

Note: A 1/2" and two 9/16" wrenches are required to tighten all the connections. See *Figure 3-25*.

Figure 3-25 Tighten all Nuts and Bolts (different vehicle shown)



SA Module Installation

The **SA Module Installation** chapter contains information in the following sections:

- *SA Module Mounting Orientation*
- *Mount the SA Module*

SA Module Mounting Orientation

The SA Module can also only be mounted in certain orientations. *Figure 4-1* shows the correct mounting positions and *Figure 4-2* shows incorrect mounting positions.

Figure 4-1 Correct SA Module Mounting Orientations

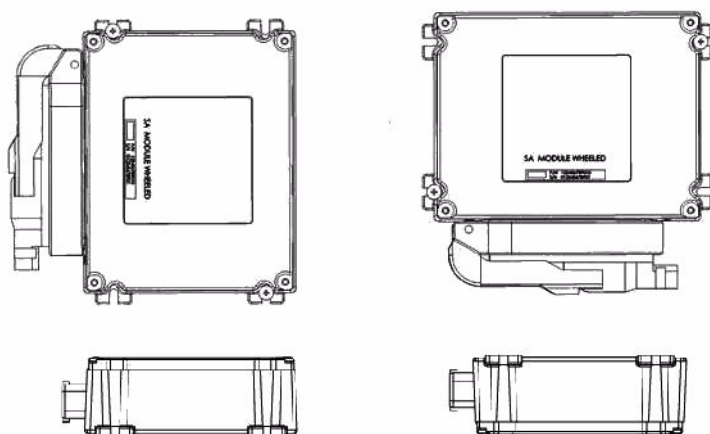
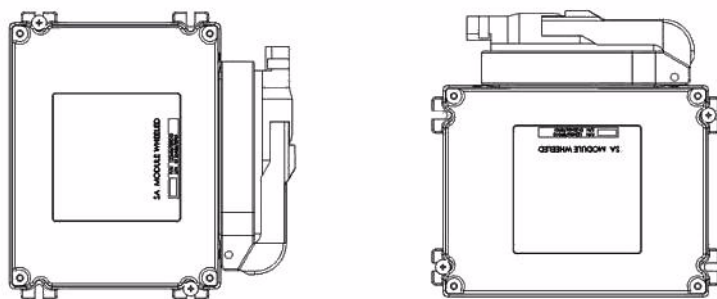


Figure 4-2 Incorrect SA Module Mounting Orientations



Mount the SA Module

Due to the variety of vehicles options available and the possible configuration differences, it may be necessary to install the SA Module in a location other than the example shown here. If an alternative location is required, choose a location where the SA Module can be protected from damage, moving parts or crop debris, and excessive moisture from weather and cleaning equipment.

Installation Procedure

1. Prepare the SA Module Bracket for installation by attaching two screws on the “L” bracket side of the bracket. See *Figure 4-3*.

Note: Do not tighten the screws. Leave enough room for the SA Module to slide beneath the screws.

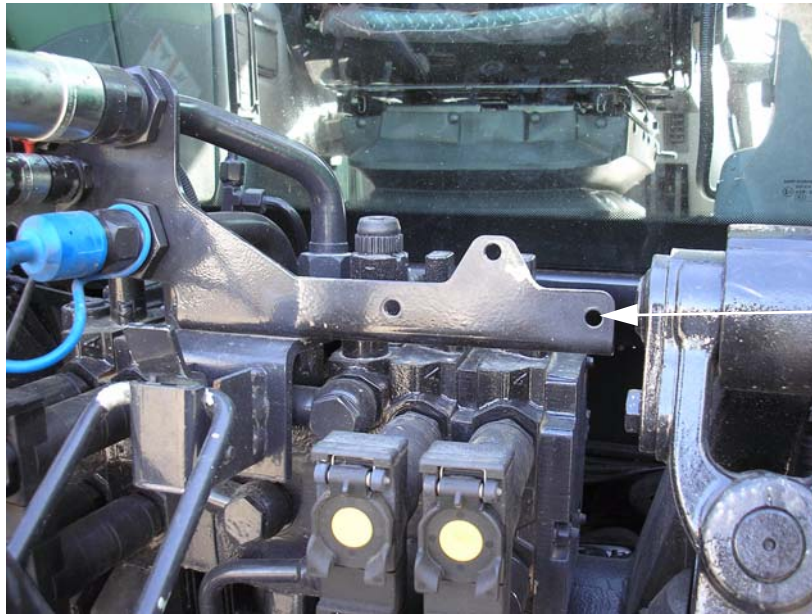
Figure 4-3 Attach Screws to Bracket “L” Side



2. Locate the steel bracket with holes on the rear valve stack top. See *Figure 4-4*.

Note: This bracket may be different depending on your exact vehicle model.

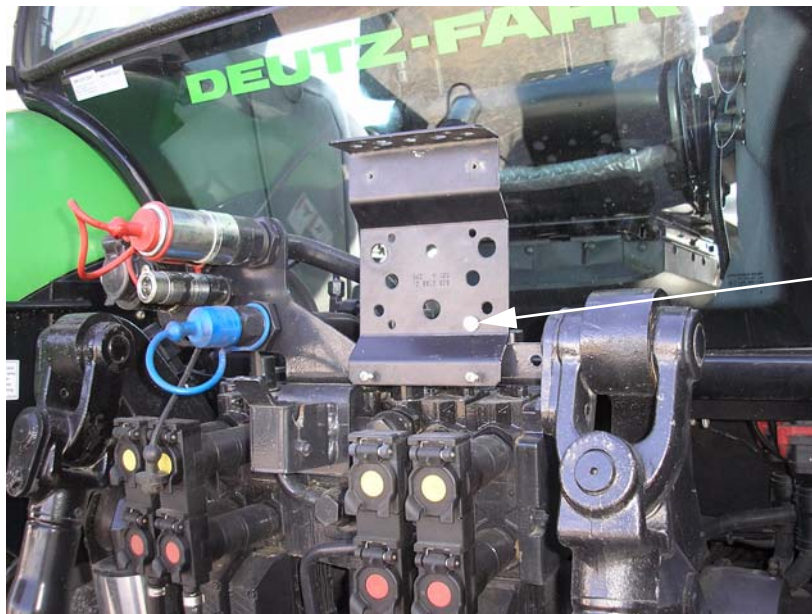
Figure 4-4 SA Module Mounting Position



Mounting Bolt Hole

3. Install the SA Module bracket using the kit provided bolt, washer and nut. See *Figure 4-5*.

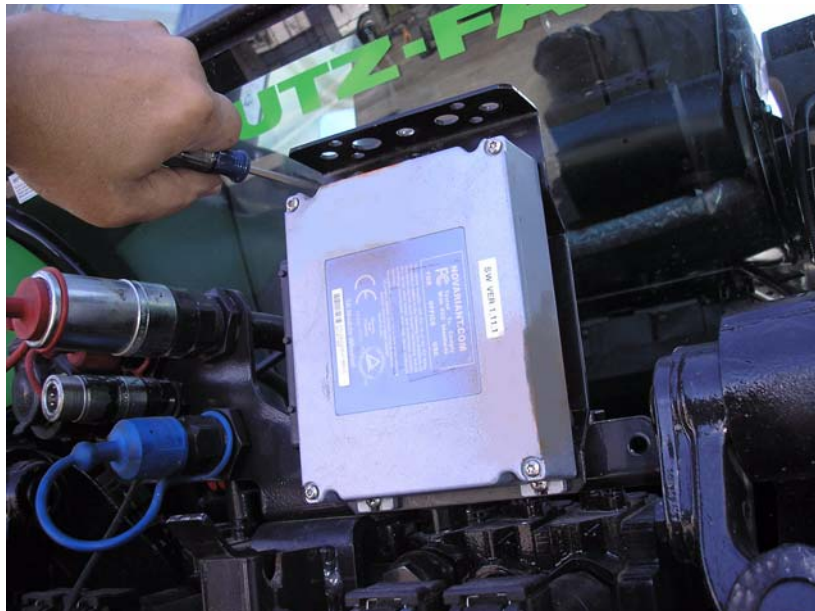
Figure 4-5 Removing the Mounting Bolt



Mounting Bolt

4. Slide the SA Module into place. Mount it by installing the other two screws and tighten all four screws with a #2 Phillips screwdriver. See *Figure 4-6*.

Figure 4-6 Slide SA Module into Place



5. The SA Module is now mounted.


Roof Module Installation

This **Roof Module Installation** chapter contains information in the following sections:

- *Safety Notes*
- *Roof Rail Installation*

Safety Notes

- The AutoSteer system must be powered OFF when installing or removing the Roof Module.
- The Roof Module must always be firmly secured to the Roof Rail using the hardware whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.
- The Roof Module must be removed when transporting the vehicle at speeds above 30 mph (50 km/h).
- Ensure you are in a stable position on the vehicle or ladder when installing or removing the Roof Module, so you do not fall or drop the Roof Module.

	<p style="text-align: center;">⚠ WARNING</p> <p>To prevent injury from falling, ensure you are in a stable position on the vehicle when installing or removing the Roof Rail and Roof Module. If the vehicle does not provide a safe platform, use a ladder to safely access the vehicle roof while installing or removing the Roof Rail and Roof Module.</p>
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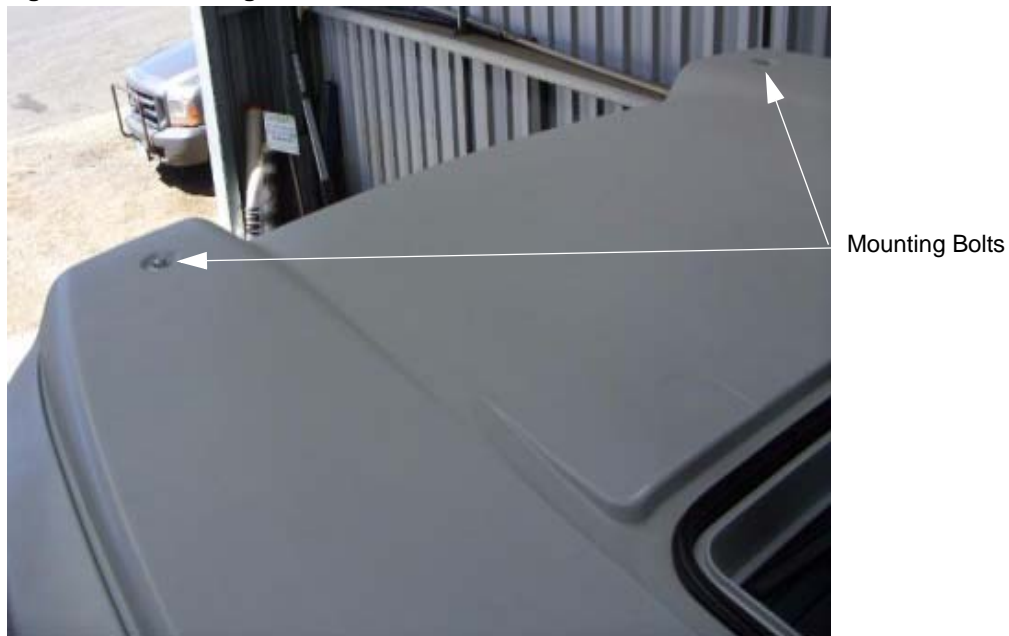
Roof Rail Installation

1. Place the ladder as close as possible to the cab rear.

Note: The ladder is necessary to install the Roof Rail and Roof Module.

2. Locate the two rear cab roof bolts. See *Figure 5-1*.

Figure 5-1 Mounting Bolt Location



3. Remove the two bolts using a 13mm socket and ratchet and 13mm wrench. See *Figure 5-2*.

Note: The existing bolts are replaced with longer bolts, discard the existing bolts. Leave the flat washer on the roof top.

Figure 5-2 Removing Roof Bolts



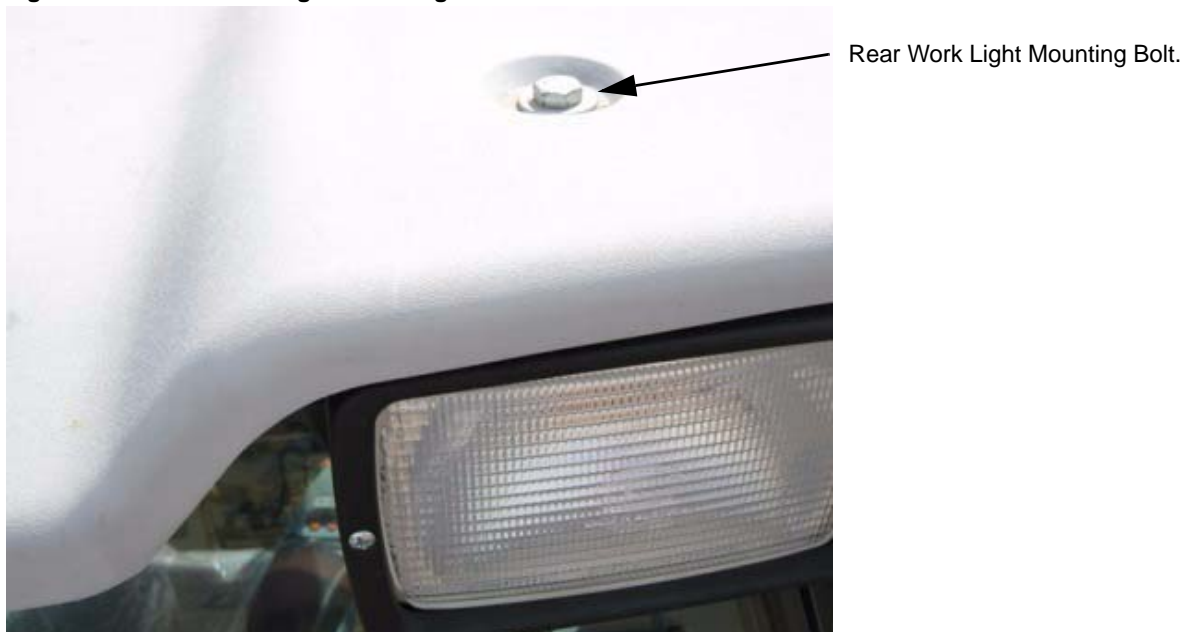
Note: You may have to cut cable ties to loosen the headlight cables in order to reach the bottom side nut. See *Figure 5-3*.

Figure 5-3 Rear Worklight Underside



4. The bolts travel all the way through the roof and are used to fasten the rear work lights to the cab roof. Leave the existing washer in position. See *Figure 5-4*.

Figure 5-4 Rear Work Light Mounting Bolt.



Note: Do not loose the existing hex nuts when removing the screws. These nuts are located in a hex retaining hole in the plastic shell. See *Figure 5-5*.

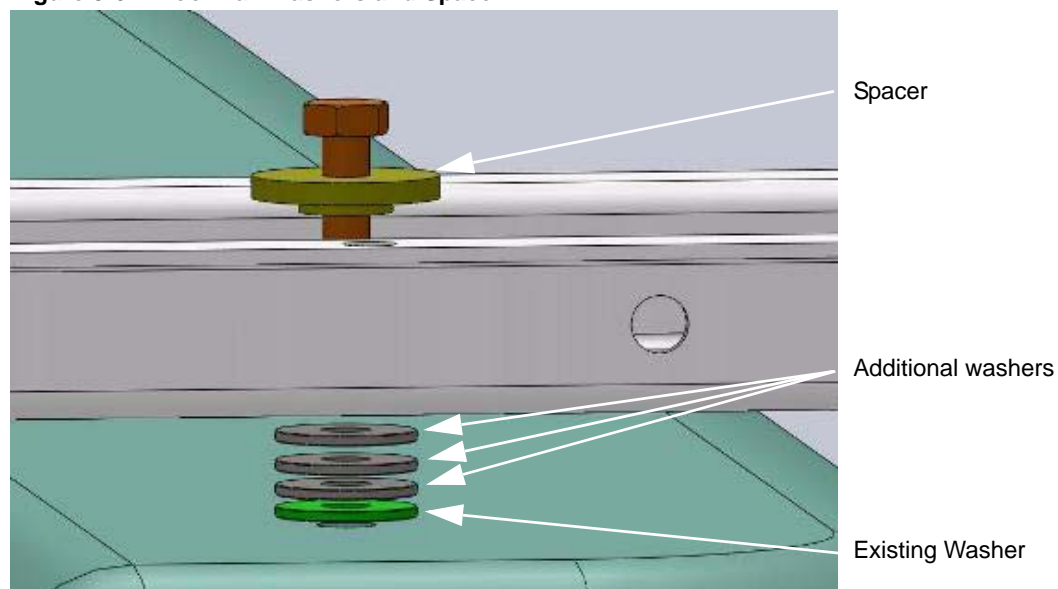
Figure 5-5 Rear Worklight Mounting Nut



Note: Before installing the Roof Rail, install the small bracket with two parking connectors which are used to secure ParaDyme cables when the vehicle does not have a Roof Module installed.

5. Place the Roof Rail on the cab top over the existing washers with the Roof Rail locking pin on the vehicle left side.
6. Center the Roof Rail over the cab.
7. Place a kit provided spacer on the Roof Rail top side. See *Figure 5-6*.
8. Place three flat washers (PN: 517-0021-01) between Roof Rail and the existing roof washer.
9. Install the kit provided M8 x 45mm mounting bolts. See *Figure 5-6*.

Figure 5-6 Roof Rail Washers and Spacer



10. Replace the rear work lights.

Note: When installing the rear worklights, ensure the original flat washer is in place. See *Figure 5-7*.

Figure 5-7 Replacing Rear Worklights



11. Tighten both the Roof Rail bolts securely with a 13mm socket, ratchet and 13mm wrench. See *Figure 5-8*.

Figure 5-8 Attach the Roof Rail



12. The Roof Rail is now installed. See *Figure 5-9*.

Figure 5-9 Installed Roof Rail

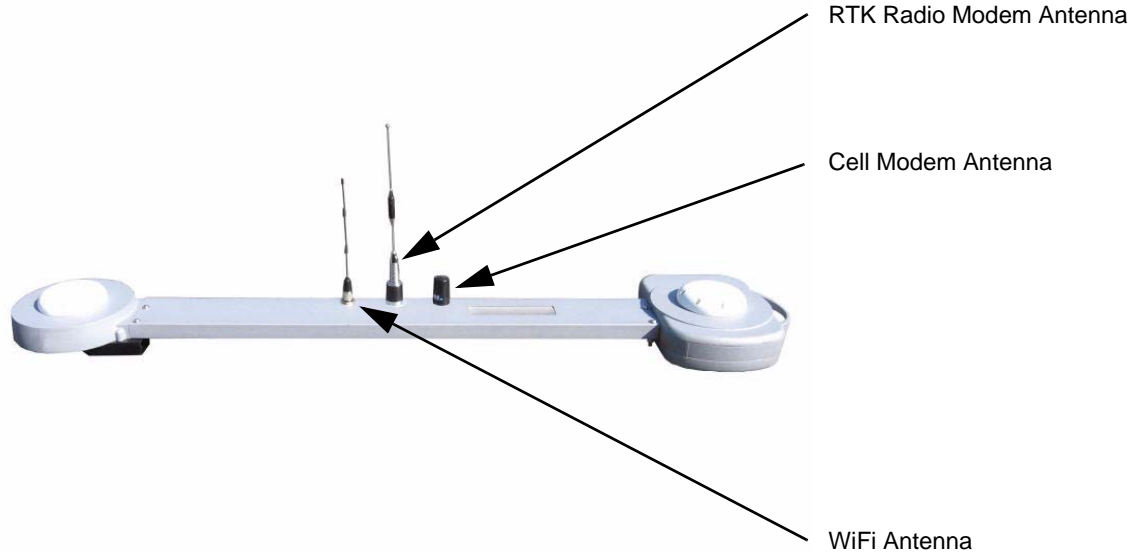


Parking Connectors

13. Attach the antennas to the proper Roof Module antenna connections. See *Figure 5-10*.

Note: Your installation may not require all three antennas. Hand tighten the antenna connections. Do not over tighten.

Figure 5-10 Attach the Antennas



14. Remove the Roof Rail Locking Pin. See *Figure 5-12*.

Figure 5-11 Remove Locking Pin



15. Place the Roof Module on the Roof Rail. See *Figure 5-12*.

Figure 5-12 Attach Roof Module



16. Reinsert the Locking Pin into the Roof Rail. See *Figure 5-13*.

Figure 5-13 Reinsert Locking Pin



Note: The Locking Pin can be inserted from either Roof Rail side.

17. The completed Roof Module should appear as shown in *Figure 5-14*.

Figure 5-14 Completed Roof Module Installation



Display Installation

This **Display** chapter provides instructions for installing the cab RAM mount to enable Display mounting.

Note: Refer to your Display user manual for instructions on installing the Display.

Installation Procedure

1. Locate the position for the User Display bracket located on the door handle rail. See *Figure 6-1*.

Note: Alternative mounting locations can be used if the location shown is not available.

Figure 6-1 Locate the Accessory Mounting Bracket



2. Attach the kit supplied Universal Display Bracket to the door handle rail using two U-bolt clamps. See *Figure 6-2*.
3. Tighten the U-bolts using a 13mm wrench.

Figure 6-2 Position of Universal Mounting Bracket on Door Handle Rail



4. Place rubber caps on the bolt thread ends. See *Figure 6-3*.

Figure 6-3 Place Rubber Caps on Bolt Threads



Rubber Caps

5. Attach the Ram Mount Ball to Display Mounting Bracket using the four kit provided screws and lock nuts. See *Figure 6-4*.
6. Tighten the screws using a 3/8" wrench and #2 Philips screwdriver.

Figure 6-4 Ram Mount Assembled to Universal Bracket.



Note: Refer to the Display user manual for the remaining Display specific installation instructions.

Connecting System Cables

This **Connecting System Cables** chapter provides information for connecting the Main Cable Harness and the SA Module Cable Harness to the various vehicle and AutoSteer components in the following sections:

- *SA Module Harness*
 - *SA Module Connection*
 - *Wheel Angle Sensor Connection*
 - *Steering Valve Connection*
- *Main Cable Harness*
 - *Roof Module*
 - *Main Cable Harness Connections Inside Cab*
 - *SA Module Harness*
- *Power Supply Connection*
 - *Cab Power Connection*
 - *Battery Power Connection*

SA Module Harness

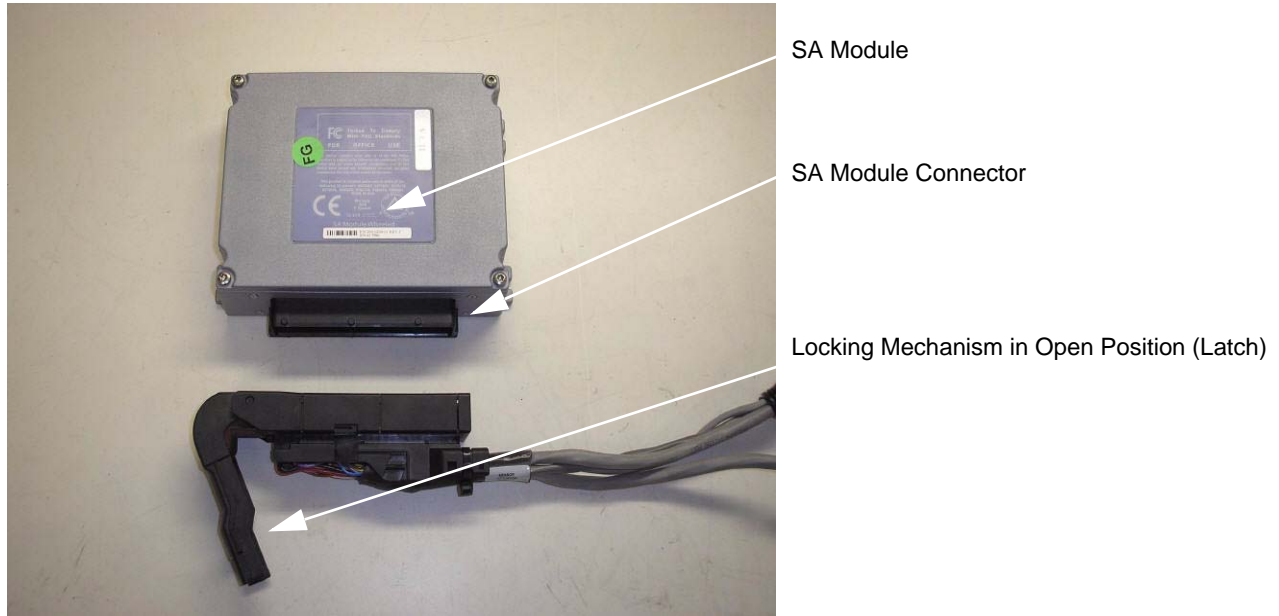
This **SA Module Harness** section contains the following sub-sections:

- *SA Module Connection*
- *Wheel Angle Sensor Connection*
- *Steering Valve Connection*

SA Module Connection

1. Align the SA Module Harness connector to the SA Module. See *Figure 7-1*.
2. Open the connector latch lever. See *Figure 7-1*.

Figure 7-1 Connecting SA Module Connector



3. Press the SA Module Harness connector onto the SA Module connector.

Note: You can damage the connectors if you force them into position. Do not force them together or use tools.

4. Press the latch lever closed until it clicks and locks the connector. See *Figure 7-2*.

Figure 7-2 Closing the SA Module Connector



Wheel Angle Sensor Connection

Note: If you need to disconnect the SA Module connector, you must open the latch lever before attempting to pull the connectors apart.

5. Close the cable connector locking mechanism as shown in *Figure 7-3*.

Figure 7-3 SA Module Connector (Closed).



Wheel Angle Sensor Connection

Note: This connection to the Wheel Angle Sensor is only required when using the AutoSteer Wheel Angle Sensor.

1. Route the Wheel Angle Sensor lead under the cab and along the engine side toward the front axle and secure with cable ties. See *Figure 7-4*.

Figure 7-4 Routing of Wheel Angle Sensor Cable



2. Connect the Wheel Angle Sensor connector to the Wheel Angle Sensor. Use a cable tie to ensure the cable is secure. See *Figure 7-5*.

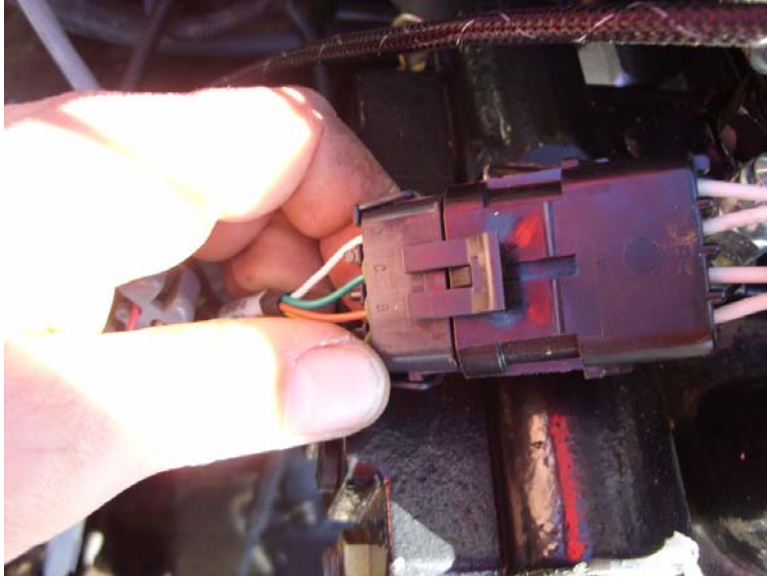
Figure 7-5 Connecting the Wheel Angle Sensor Plug



Steering Valve Connection

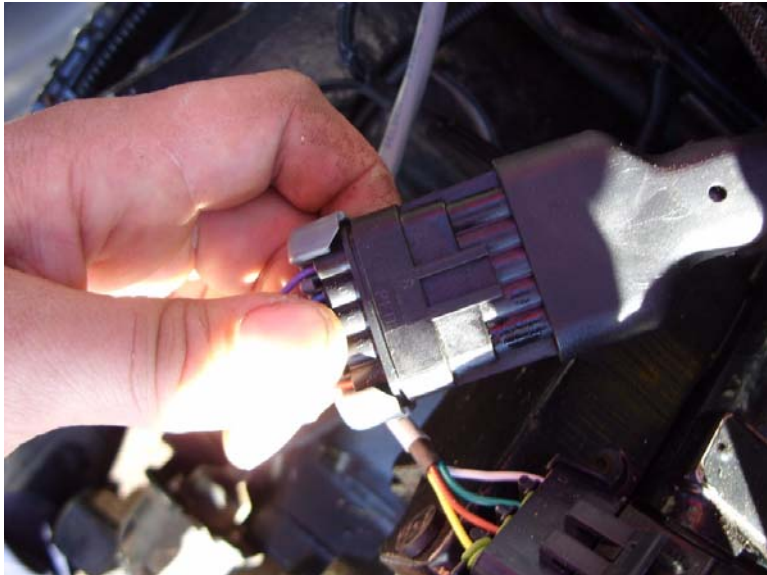
1. Connect the Main Cable Harness connector from the Steering Valve (4-pin weather pack) to the SA Module Harness. See *Figure 7-6*.

Figure 7-6 Connect Main Cable Harness to SA Module Harness



2. Connect the Enable Valve Adapter Harness (10-pin Metripack) to the SA Module Harness. See *Figure 7-7*.
3. Locate the Reactive Steering Harness (PN: 201-0480-01) and connect the 10-pin Metripack to the SA Module Harness.

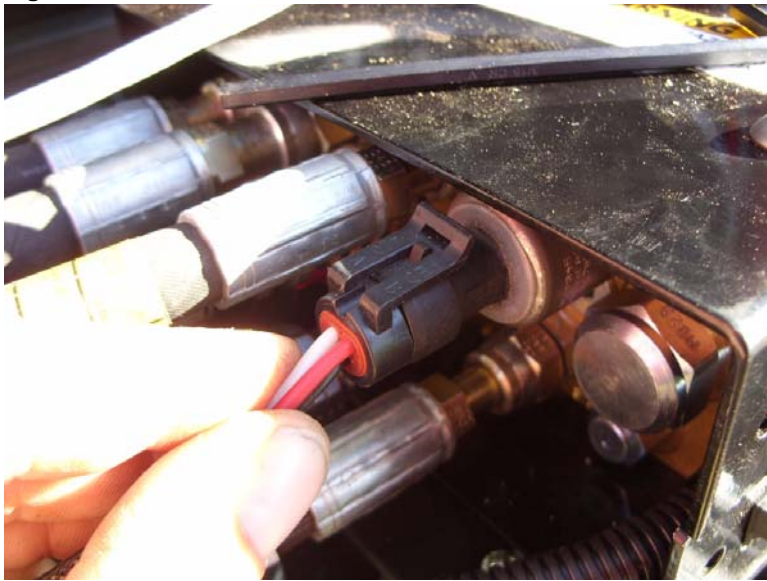
Figure 7-7 Connect Enable Valve Harness



Note: This installation does not use the short 10-pin Metripack to 3-pin Pressure Transducer harness provided standard with the block.

4. Connect the 3-pin Metripack connector to the Pressure Transducer on the Steering Valve. See *Figure 7-8*.

Figure 7-8 Pressure Transducer Connection



5. Route the two Deutsch plugs from the Reactive Steering Harness (PN: 201-0480-01) to the reactive solenoids and connect them. See *Figure 7-9*.

Figure 7-9 Connect Deutsch Plugs to Valves



Main Cable Harness

This **Main Cable Harness** section contains the following sub-sections:

- *Roof Module*
- *Cables Entering the Cab*
- *Main Cable Harness Connections Inside Cab*
- *SA Module Harness*

Roof Module

1. Route the antenna cable up the cab right-side and secure it using cable ties. See *Figure 7-10*.

Figure 7-10 cab Side Cable Routing



2. Attach the Main Cable Harness to the Roof Module. See *Figure 7-11*.
3. Orient the 12-pin connector so the word “TOP” on the cable connector is pointing upwards (towards the sky).
4. Insert the cable connector into the Roof Module.
5. Push the connector in until it “clicks” and locks in place.

Note: To remove the cable, grasp the connector to compress the two side latches and pull away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct connector orientation.

Figure 7-11 Roof Module Main Cable Harness Connection



6. Attach the LAN connector to the Roof Module. See *Figure 7-12*.
7. Orient the Ethernet cable connector with the connector under the receiver so the contacts on the cable connector are pointing towards the vehicle rear.

Note: This will usually be towards your right-side if you are standing on the vehicle left-side and looking towards the Roof Module.

8. Slide the cable connector into the receiver and rotate the plastic bayonet sleeve clockwise to lock the connector.
9. The bayonet sleeve will “click” when it fully engages and locks.

Note: To remove the cable, rotate the bayonet sleeve counterclockwise until it “clicks” and pull the connector down or away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct connector orientation.

Figure 7-12 Roof Module Ethernet Connection



Cables Entering the Cab

1. The cable is routed into the cab via the hatch on the cab right rear window. See *Figure 7-13*.

Figure 7-13 Hatch for Cable Routing



Note: A hole with a slot needs to be cut to enable the cables to pass into the cab.

2. Using a 1" hole saw, neatly cut a hole in the plastic hatch. See *Figure 7-14*.

Figure 7-14 Hole in Hatch



3. Using a hacksaw, cut a slot through the plastic from the edge of the plastic towards the cut out circle. See *Figure 7-15*.

Figure 7-15 Cut Slot in Hatch



4. Route the cables through the hatch. Ensure that the cables are not rubbing on any sharp areas. Protect the cables if needed. See *Figure 7-16*.

Figure 7-16 Routing Cable through Hole in Hatch.



5. Secure the cables and connectors neatly to the vehicle using cable ties. See *Figure 7-17*.

Figure 7-17 SA Harness Connectors and Cables Neatly Secured



Main Cable Harness Connections Inside Cab

Figure 7-18 shows the Main Cable Harness connections used inside the cab. *Table 7-1* shows the functions of the Main Cable Harness cab connectors.

Note: Refer to your Display user manual for instructions on connecting the Main Cable Harness connections shown to the correct ports and harnesses on the Display and Display cables.

Figure 7-18 Main Cable Harness Cab Connections

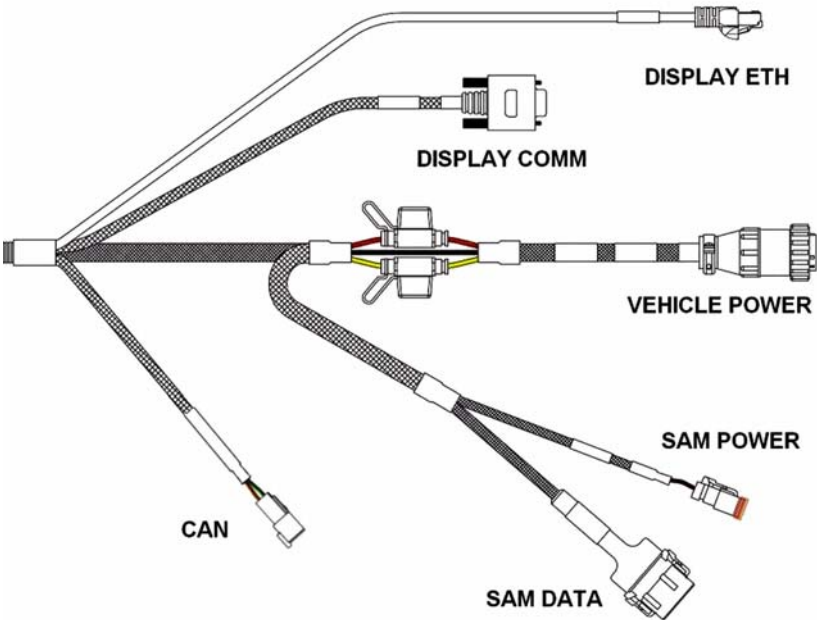


Table 7-1 Cab Main Cable Harness Connector Functions

Main Cable Harness Connector	Connector Function
DISPLAY ETH	Display Ethernet Port (RJ-45)
DISPLAY COMM	Display Communication Port (DB-9)
VEHICLE POWER	12 Volt Power Supplied by Display Harness
SAM POWER	Power for SA Module
SAM DATA	Data for SA Module
CAN	Not Used for This Installation

SA Module Harness

1. Connect the 12-pin data and 2-pin power connectors between the Main Cable Harness and the SA Module Harness. See *Figure 7-19*.

Figure 7-19 Connect Main Cable and SA Module Harnesses



Power Supply Connection

The following sub-sections describe basic instructions for connecting the AutoSteer system to available vehicle power sources:

- *Cab Power Connection*
- *Battery Power Connection*

Note: Refer to your Display user manual before connecting the AutoSteer system to vehicle power.

The Main Cable Harness must be connected to a 3-pin 12V power source. Your Display user manual provides specific instructions for connecting power to the AutoSteer system and specifies the appropriate vehicle power source.

Cab Power Connection

1. Locate the cab console right-side 12V power outlet. See *Figure 7-20*.
2. Use this 12V accessory power connector if the Display manual specifies connecting to power inside the cab.

Figure 7-20 Power Outlet Inside Cab



3. Attach the Power Adapter Cable (201-0234-01) to the cab power outlet. See *Figure 7-21*.

Figure 7-21 Connecting Power Adapter



4. Connect opposite end to the Display harness, then connect the Main Cable Harness to the Display Harness as instructed in the Display manual. See *Figure 7-22*.

Figure 7-22 Connect Power Adapter to Main Harness



Note: If there is no working 3-pin connector in the cab, provide a cab power outlet by connecting to the vehicle battery using a battery power cable adapter (PN: 201-0156-01). See the *Battery Power Connection* on page 112 for vehicle battery connection instructions.

Battery Power Connection

1. Locate the vehicle battery on the cab right-hand side behind the steps. See *Figure 7-23*.

Figure 7-23 Battery Location



2. The battery is accessed by releasing the battery cover latches on either side. See *Figure 7-24*.

Figure 7-24 Accessing Battery



3. Connect to the vehicle battery if the Display user manual specifies a direct battery connection. See *Figure 7-25*.

Figure 7-25 Battery Connection



Note: A battery cable is provided with the AutoSteer system when a direct battery connection is required.

Post-Installation Procedures and Information

This **Post-Installation Procedures and Information** chapter provides information in the following sections:

- *Adjust the Relief Valve*
- *Create New Vehicle*
- *Calibration and Tuning Guidelines*

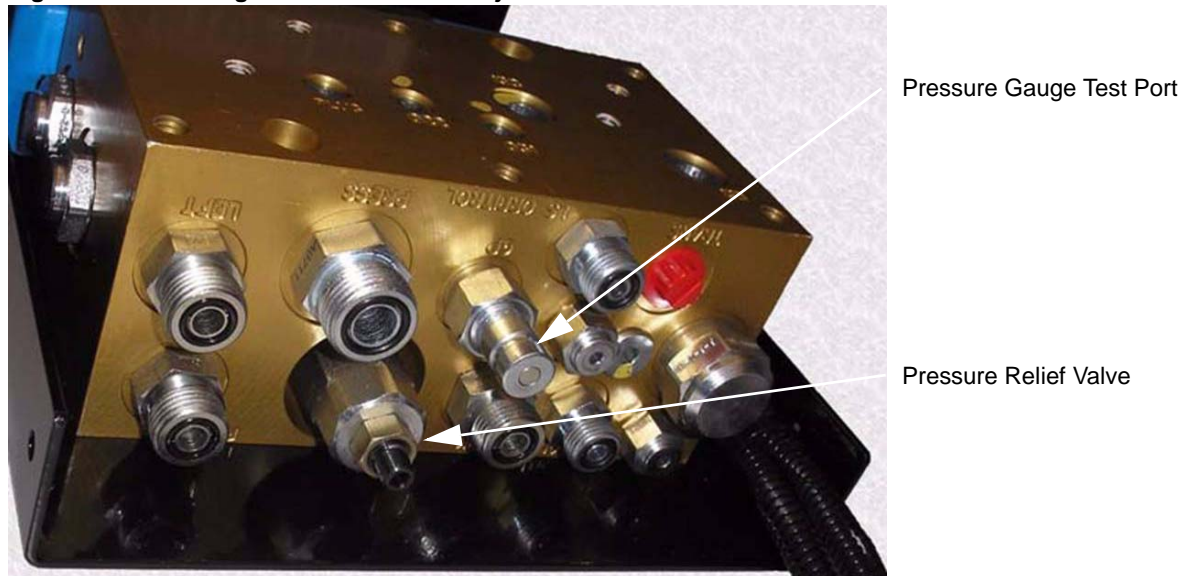
Once the entire AutoSteer system, including the Display and Display Harnesses, have been installed complete the procedures and notes provided in this chapter to complete the installation and prepare the vehicle for full AutoSteer capabilities.

Adjust the Relief Valve

The Steering Valve has a built-in Load Sense Relief Valve limiting the maximum pump pressure when using the AutoSteer system. The Pressure Relief Valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks. The Display, Roof Module, and all harnesses must be connected prior to performing this adjustment procedure.

Note: The steering valve in *Figure 8-1* is shown on a bench without the hydraulic hoses connected for ease of viewing the adjustment process. When you adjust the Relief Valve, the adjustment is performed with the valve mounted on the vehicle and the hydraulic hoses connected.

Figure 8-1 Steering Valve Relief Valve Adjustment

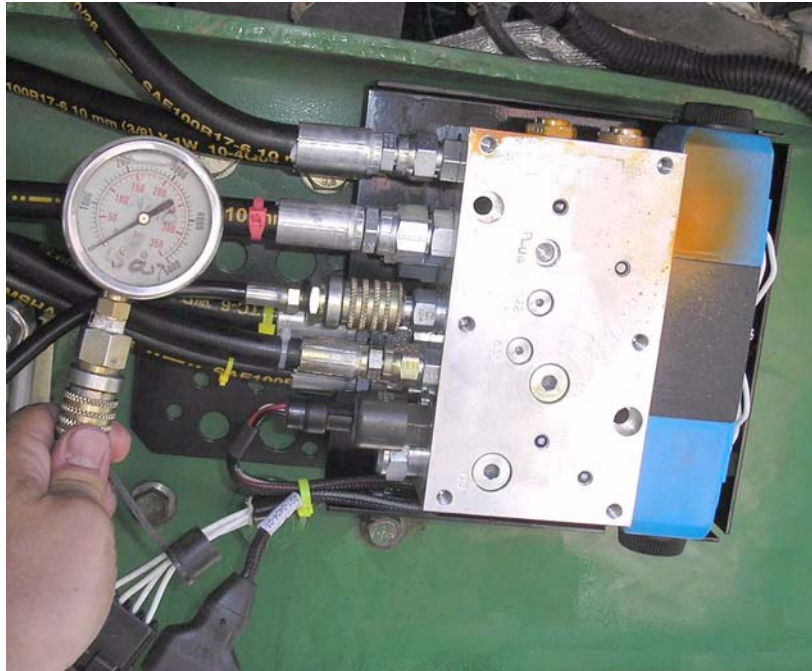


Note: Turn off the engine before adjusting the Relief Valve. Turning the engine off prevents possible vehicle movement or a high pressure fluid hazard. Do not adjust the Relief Valve with the engine running.

1. Remove the Relief Valve cover by removing the four screws with a 3/16" Allen wrench.
2. Install a 5000 psi pressure gauge on the Steering Valve diagnostics port labeled as **GP**. Use a short extension hose on the pressure gauge if necessary for easier reading.
3. Clear any bystanders from around the vehicle to prevent anyone getting injured when the steering wheels are moved in the following steps.
4. Put transmission into "neutral" or "park" position and turn on the hand brake.
5. Start the engine and leave it at low idle.
6. Immediately check for oil leaks on all previously opened hose connections.
7. Turn the steering wheel full right and then full left and check for correct manual steering response. Immediately check for oil leaks on all previously opened hose connections. Air in the hoses may cause a slight steering delay when the system is first powered up.
8. Observe the standby pump pressure shown on the pressure gauge. The standby pressure should be around 200 PSI (14 Bar) to 500 PSI (24 Bar). See *Figure 8-2*.

Note: If standby pump pressure is zero, less than 100psi, or very high, such as 3000psi, you might have a plumbing error. A high pressure could indicate Pressure and Tank hoses inverted, but before starting to troubleshoot this, be aware other vehicle functions can also cause the pressure to go high, such as lifting the hitch or activating a remote valve.

Figure 8-2 Observe Pump Pressure



Adjust the Relief Valve

9. Clear any bystanders from around the vehicle because you will be moving the front wheels.
10. Power up the AutoSteer Display.
11. Follow the instructions in the Display user manual to navigate to the Vehicle window from the AutoSteer **Setup** screen. Select **Steering Components**, and then select **Hydraulic Valve**. If the safety screen requirements have been met, press the **Continue** button.

Note: The active vehicle must be a "standard hydraulic" type in order to successfully complete *Step 11*. The default vehicle on a new system works. However, if the system has been moved from another vehicle a new vehicle profile may need to be created and selected before starting *Step 11*.

12. Press the **Steer Right** button to command the wheels to turn to the right. Allow the steering axle to reach the right stop and hold it there.
13. The maximum pump pressure allowed by the AutoSteer valve is displayed on the pressure gauge.
14. Turn off the vehicle and the AutoSteer Display.

Note: Do not adjust the Pressure Relief Valve with the engine running as there is a chance that a person could get injured if the steering wheels move while working on the Pressure Relief Valve.

Note: The steering valve in *Figure 8-3* is shown on a bench without the hydraulic hoses connected for ease of viewing the adjustment process. When you adjust the Relief Valve, the adjustment is performed with the valve mounted on the vehicle and the hydraulic hoses connected.

Figure 8-3 Adjusting Relief Valve



15. Adjust the Relief Valve screw clockwise to increase pressure and counter-clockwise to decrease pressure with a 5/32" Allen wrench.
 16. Repeat Step 10. through Step 15. until the maximum steering pressure in AutoSteer mode at *Step 13*. is 2200 psi +/- 100 psi.
 17. Once the Pressure Relief Valve has been adjusted properly, retighten the jam nut with a 1/2" wrench while holding the adjustment screw with a 5/32" Allen wrench to lock it into place.
 18. Record the final maximum pressure the Pressure Relieve Valve is set to: _____ PSI (Bar).
 19. Press the Stop button and confirm the pressure drops back to the standby pressure within a second. If the pump pressure remains high after pressing the Stop button, the pump is remaining stroked up. To resolve this in most cases, recheck that the plug was exchanged for an orifice in position 13A. If that is confirmed, ensure the orifice is not blocked.
- Shut down the AutoSteer Display, turn off the engine, and remove the pressure gauge from the Steering Valve by sliding the sleeve on the quick release coupler.

Create New Vehicle

Once the entire system has been installed, the operator must first create a new vehicle profile. This configures the system so the Display can properly communicate with the various vehicle sensors and components. Follow the procedure below to create a new vehicle.

1. Make sure the Display is not powered ON.
2. Start the vehicle and take it to a clear area (such as an open field) where it can be calibrated.
3. Power up the AutoSteer system.
4. Follow the instructions provided in the Display user manual to create a new vehicle.

Calibration and Tuning Guidelines

Note: For optimal steering performance, the AutoSteer system must be fully calibrated and then tuned.

Final Hardware Installation Checklist

This **Final Checklist** chapter contains the verifications steps necessary after the installation of the AutoSteer system.

Note: The Final Hardware Installation Checklist is on the back of this page. Tear this page out of your manual and fill in the checklist after the installation. You should keep a copy of this checklist for future reference when servicing the vehicle.

Machine Model: _____ Year: _____ Serial #: _____

Customer Name: _____

Location/Address: _____

AutoSteer Installation Kit Part Number: _____

NOTES

Name of Installer: _____ Date: _____

System Installation Checklist

1. Wheel Angle Sensor installed and all fasteners are tight. (if installed) ☐
2. Display Bracket is installed and all fasteners are tight. ☐
3. Display is installed and all fasteners are tight. ☐
4. Roof Rail and Roof Module are installed and all fasteners are tight. ☐
5. SA Module is installed and all fasteners are tight. ☐
6. All cable ends are connected. ☐
7. All cables are secured with cable ties. ☐

Hydraulic Installation Checklist

1. Steering Valve Bracket is installed and all fasteners are tight. ☐
2. Steering Valve is installed and all fasteners are tight. ☐
3. All hose fittings are tight. ☐
4. Check for oil leaks on all hydraulic connections. ☐
5. All hoses are routed and secured with cable ties. ☐
6. Manual steering is normal after the AutoSteer installation. ☐
7. Relief Valve is adjusted. ☐

AutoSteer Performance Checklist

1. Complete AutoSteer system calibration. ☐
2. Complete AutoSteer system tuning. ☐
3. Check total Wheel Angle Sensor counts. ☐ Value _____
4. Line acquisition is satisfactory. ☐
5. On-line steering is satisfactory. ☐
6. Manual override (kick-out) is working. ☐ Kick-out _____
7. Steering speed from lock-to-lock is satisfactory. ☐ Value _____ Sec.

Note: See the *Post-Installation Procedures and Information* chapter for additional information.
